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REPORT

OF THE

SUDAN MEDICAL SERVICE

FOR THE YEAR

1946

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SUDAN MEDICAL SERVICE
ANNUAL REPORT 1946.

CONTENTS.

CHAPTER. PAGE
I. INTRODUCTION 1
II. HEALTH OF OFFICIALS 2
III. EPIDEMIC DISEASE 3
1. Cerebrospinal Meningitis 3
2. Diphtheria 3
3. Relapsing Fever 4
4. Smallpox 4
IV. ENDEMIC DISEASE 5
1. Ancylostomiasis 5
2. Blackwater Fever 5
3. Dracontiasis 6
4. Dysenteries 6
5. Enteric Fevers 6
6. Hydatid Disease 6
7. Leishmaniasis 6
8. Leprosy 8
9. Malaria 8
10. Rabies 10
11. Rheumatism 11
12. Schistosomiasis 11
13. Trypanosomiasis 13
14. Tuberculosis 13
15. Tumours 15
16. Undulant Fever 16
17. Venereal Disease 16
V. PUBLIC HEALTH 17
1. Quarantine 17
2. Antenatal and Maternity Service 18
3. Infant and Child Welfare 18
4. School Health 20
5. Rural Health 24
6. Nutrition 24

CHAPTER. PAGE

7. Legislation 24

8. Health in Provinces 25

(*a*) Blue Nile .. .. 25 (*e*) Khartoum 31

(*b*) Darfur .. .. .. 27 (*f*) Kordofan 33

(*c*) Equatoria .. .. 28 (*g*) Northern 35

(*d*) Kassala .. .. .. 29 (*h*) Upper Nile .. 37

VI. PILGRIMAGE FROM THE SUDAN 38

VII. MEDICAL WORK OF MISSIONS 42

VIII. STACK MEDICAL RESEARCH LABORATORIES : Dr. E. S. Horgan .. 43

IX. MEDICAL ENTOMOLOGY : Mr. D. J. Lewis 51

X. WELCOME CHEMICAL LABORATORIES : Dr. A. J. Henry 54

XI. KITCHENER SCHOOL OF MEDICINE : R. M. Buchanan 56

XII. S.M.S. SCHOOL OF HYGIENE 59

XIII. OMDURMAN MIDWIVES' SCHOOL 61

XIV. OTHER TRAINING 63

XV. S.M.S. GRAPHIC MUSEUM 63

APPENDICES.

TABLE I. STAFF OF THE S.M.S. 64

TABLE II. INCOME AND EXPENDITURE OF THE S.M.S. .. 66

TABLE III. INPATIENT STATISTICS. 67

TABLE IV. OUTPATIENT STATISTICS. 68

DIAGRAM I. DEATHS IN HOSPITALS AND DISPENSARIES : MORTALITY BY DISEASES. 69

DIAGRAM II. DEATHS IN HOSPITALS AND DISPENSARIES : FATALITY RATE BY DISEASES. 70

CHAPTER I.

INTRODUCTION

The state of the public health remained satisfactory throughout the year.

Some scattered cases of alastrim appeared in the Upper Nile and Equatoria Provinces and one case of smallpox was imported into Wadi Halfa from Egypt.

No case of typhus or of yellow fever was reported in the Sudan throughout the year.

Coincident with the liberal use of D.D.T. powder in widespread delousing "campaigns" the incidence of relapsing fever fell sharply and there were only 1,952 cases reported as contrasted with 17,392 in 1945.

The Nile flood was the highest recorded and the river overflowed its banks along many miles rendering some 120,000 people homeless and providing ideal mosquito breeding grounds. Fortunately, early and effective measures prevented an outbreak of malaria although the incidence of this disease was higher than normal in the rain-belt of the Sudan.

The receding Nile left vast expanses of land—overlain with silt—which were cultivated and produced a rich harvest.

The annual crops gave a good average yield and the people's food was assured till the next harvest.

Progress in curative medicine was maintained as reference to Table I shows. Whilst there was a slight drop in the total number of admissions to hospitals, there was a further rise in the number of out-patient attendances at hospitals and dispensaries.

TABLE I.

YEAR	Admissions	Attendances	Operations
1937	101,088	6,675,989	12,063
1938	104,366	6,989,990	11,439
1939	105,103	7,119,973	11,253
1940	104,422	6,649,335	11,139
1941	103,023	6,330,711	10,417
1942	114,837	6,750,329	11,353
1943	112,275	6,796,372	12,726
1944	131,077	7,077,919	13,796
1945	131,571	7,897,148	15,455
1946	126,586	8,474,874	15,509

All treatment in out-patient departments and in the third class wards of hospitals is free. The number of hospital beds now available is about one per 1000 of the population. During the year further steps were taken to improve the existing facilities in hospitals and, by the institution of new and fuller courses of training for the various categories of staff, to improve the standards of nursing.

Progress in preventive medicine has also been maintained. The use of D.D.T. powder in hospitals, dispensaries, schools, and prisons, and its sale in village shops largely removed the danger of extensive outbreaks of the louse-borne diseases, typhus and relapsing fever. Household remedies were distributed throughout the Northern Sudan and achieved a ready sale in village shops ; these remedies include aspirin, tincture of iodine, dressings, mepacrine, epsom salts, and D.D.T. powder, made up in packets and sold at a price within the reach of ordinary country people. Anti-malarial work and measures against *aedes* mosquitoes were extended and improved in many parts of the country. D.D.T. in oil was put into use as a mosquito larvicide and, in this land of scattered villages and great distances soon proved its value. Particular attention was given to maternity and child welfare work, both in towns and villages, and school children were given demonstrations in hygiene and the prevention of disease in the Graphic Museum.

The school medical service throughout the Sudan, and the special school dental service in the three towns of Khartoum, Khartoum North, and Omdurman, were well maintained.

The Nutrition Committee continued its work and a subsidiary committee began its investigations in Equatoria.

Research was carried out on onchocerciasis in Equatoria, on the taxonomy of sand flies, on the treatment of kala-azar with sodium antimony gluconate, on the stability of different preparations of penicillin in normal climatic conditions of the Sudan, on methods of determining the sensitivity of organisms to penicillin, on the intensive treatment of schistosomiasis with antimony (method of Alves and Blair), on the changes that stilbamidine undergoes on irradiation, and on the seed oils of Chrozophora Plicata and of Dobera Roxburghii.

CHAPTER II.

HEALTH OF OFFICIALS.

The figures for the sickness rates among officials, given in Table 2 below, show an improvement on those for 1945 :—

TABLE 2.

Sudan 1946

Health of Officials.

NATIONALITY		Number of officials employed	Total		Average days sickness		Died	Invalided
			Placed on sick list	No. of days sick	For all officials	For those who were sick		
British	1945 ..	782	236	2 313	2.95	9.80	1	4
	1946 ..	821	186	1,549	1.89	8.33	2	8
Sudanese	1945 ..	4,172	1,359	12,729	3.05	9.36	5	24
	1946 ..	4,426	1,196	10,718	2.42	8.96	8	15
Egyptian	1945 ..	351	141	1,094	3.12	7.75	—	2
	1946 ..	316	82	655	2.07	7.99	2	2

CHAPTER III.

EPIDEMIC DISEASE.

1. CEREBROSPINAL MENINGITIS.

Although Khartoum was the only province from which cases of cerebrospinal meningitis were not reported, yet the total for the whole country was only 730 cases contrasted with 6166 in 1945.

The case mortality rate, however, was higher than in 1945 and confirms the experience of previous years that the mortality rate among the scattered population of the Sudan is higher when the disease occurs in sporadic form.

TABLE 3.

Cerebrospinal Meningitis

Incidence in the last ten years.

YEAR	Cases	Deaths
1937	446	293
1938	234	124
1939	2,714	647
1940	4,032	796
1941	1,824	459
1942	2,787	1,027
1943	3,526	765
1944	2,346	405
1945	6,166	666
1946	730	155

The distribution by Provinces in 1946 was :

PROVINCE	Cases	Deaths
Blue Nile	30	8
Darfur	2	2
Equatoria	656	132
Kassala	2	2
Khartoum	—	—
Kordofan	29	5
Northern	5	5
Upper Nile	6	1
TOTALS	730	155

2. DIPHTHERIA.

There has been a steady increase in the number of cases of Diphtheria reported over the last ten years.

TABLE 4.

Diphtheria

Incidence in the last ten years.

YEAR	Cases	YEAR	Cases
1937	36	1942	207
1938	51	1943	309
1939	77	1944	270
1940	114	1945	389
1941	186	1946	390

The distribution by Provinces in 1946 was :—

PROVINCE	Cases	Deaths
Blue Nile	40	8
Darfur	6	1
Equatoria	3	—
Kassala	52	10
Khartoum	182	23
Kordofan	48	4
Northern	56	15
Upper Nile	3	—
TOTALS	390	61

In Khartoum Province 182 cases occurred (143 in 1945) and the disease maintained a higher incidence in those provinces with direct connections with neighbouring countries and having foreign elements in their populations.

3. RELAPSING FEVER.

There were 1952 cases reported during the year with 65 deaths. Nineteen cases were imported from Egypt, of which two were diagnosed after entry into the Sudan.

Ample stocks of D.D.T. powder allowed delousing to be undertaken on a large scale and only 840 cases of relapsing fever occurred among the Shilluk as contrasted with 7474 in 1945.

The case mortality rate was low being 3 per cent. for the whole of the Sudan.

TABLE 5.

Relapsing Fever

Incidence in the last ten years

YEAR	Cases	Deaths	YEAR	Cases	Deaths
1937	374	48	1942	5,287	559
1938	1,124	116	1943	10,505	668
1939	1,006	92	1944	22,672	310
1940	1,487	45	1945	17,392	444
1941	3,028	110	1946	1,952	65

Distribution by Provinces in 1946 was :—

PROVINCE	Cases	Deaths
Blue Nile	462	12
Darfur	278	43
Equatoria	—	—
Kassala	32	2
Khartoum	4	—
Kordofan	314	1
Northern	22	1
Upper Nile	840	6
TOTALS	1,952	65

4. SMALLPOX.

No cases of variola major were reported in the Sudan during 1946 ; one imported case from Egypt was quarantined in Wadi Halfa.

Sixty two cases of alastrim with one death were reported in the Upper Nile and Equatoria Provinces.

During the year 528,394 vaccinations were carried out.

TABLE 6.

Smallpox.

Incidence in the last ten years.

YEAR	Cases	Deaths	YEAR	Cases	Deaths
1937	425	57	1942..	12	—
1938	527	158	1943..	182	36
1939	553	103	1944..	242	51
1940	515	104	1945..	—	—
1941	46	—	*1946..	62	1

*One case was imported into the Sudan from Egypt.

No cases of Typhus or Yellow Fever were reported during the year.

CHAPTER IV.

ENDEMIC DISEASE.

1. ANCYLOSTOMIASIS.

There was no significant change in the incidence of this disease. It was present in Equatoria, and, to a much less extent, in a few parts of the Northern Province.

The results on the incidence of ancylostomiasis of the provision of pit latrines in a few selected villages of a primitive people in Equatoria are being studied.

2. BLACK WATER FEVER.

Cases during the last seven years have been :—

YEAR	Cases	Deaths	YEAR	Cases	Deaths
1940	24	9	1944..	11	4
1941	28	9	1945..	14	2
1942	29	11	1946..	14	3
1943	17	3			

These figures show a decline in incidence during the last five years and, although there were more cases of malaria in 1946, there was not a corresponding increase in the number of cases of blackwater fever.

Mepacrine has largely replaced quinine in treatment, and in prophylaxis, of malaria whilst paludrine is now coming into use.

The nationalities or races of the fourteen cases were :—

Sudanese (Arab) 13 and European 1.

TABLE 7.

Blackwater Fever.

Incidence by age and sex in Provinces.

PROVINCE	MALE		FEMALE		AGE GROUPS IN YEARS.				
	Cases	Deaths	Cases	Deaths	5-15	15-25	25-35	35-45	45-65
Blue Nile	3	1	2	1	—	2	1	2	—
Equatoria	1	—	1	—	1	—	—	1	—
Kassala	2	1	—	—	1	—	1	—	—
Kordofan	1	—	—	—	—	—	—	1	—
Upper Nile	4	—	—	—	2	—	—	2	—
TOTALS	11	2	3	1	4	2	2	6	—

3. DRACONTIASIS.

During the year 2793 cases of dracontiasis were reported, as compared with 2761 in 1945, and 512 were admitted to hospital.

There were fewer cases in the Blue Nile, Equatoria, and Kordofan Provinces where the disease has long been endemic but more cases in Kassala Province, where it is not known that the disease has been long established and where active measures were taken to protect water supplies.

4. DYSENTERIES.

Cases admitted to hospital were 3838 as compared with 3519 in 1945. Of these 450 were diagnosed as the bacillary type. These figures probably do not represent the true incidence of the two diseases as facilities for bacteriological diagnosis do not exist in the smaller hospitals.

5. ENTERIC FEVERS.

Cases reported were 116 with 14 deaths contrasted with 183 cases and 11 deaths in 1945.

The disease did not appear in epidemic form and the cases were scattered throughout the Sudan. Omdurman, a large native town in Khartoum Province, is an endemic focus.

Distribution by Provinces was :—

PROVINCE.	Cases	Deaths
Blue Nile	9	5
Darfur	2	—
Equatoria	4	—
Kassala	21	2
Khartoum	42	4
Kordofan	6	—
Northern	17	—
Upper Nile	15	3
TOTALS	116	14

TABLE 8.

Enteric Fevers.

Incidence in the last ten years.

YEAR.	Cases	YEAR.	Cases
1937	165	1942	167
1938	213	1943	145
1939	202	1944	199
1940	336	1945	183
1941	129	1946	116

6. HYDATID DISEASE.

This disease, as in previous years, was reported among the Taposa people living in Kapoeta District. There were 40 cases reported as compared with 54 in 1945.

7. LEISHMANIASIS.

There were 246 cases reported with 50 deaths as compared with 192 cases with 39 deaths in 1945.

TABLE 9.

Leishmaniasis

Incidence in the last ten years.

YEAR.	Cases	YEAR.	Cases
1937	336	1942	432
1938	296	1943	225
1939	394	1944	201
1940	460	1945	192
1941	494	1946	246

This disease is still practically confined to the Fung District (of the Blue Nile Province), the southern part of Kassala Province and to a small area in Equatoria. Cases occurring in other parts of the Sudan are commonly imported there and immigrants into the endemic foci appear to be highly susceptible to the disease.

TABLE 10.

Sudan 1946.

Visceral Leishmaniasis Distribution by Provinces

PROVINCE	MALE		FEMALE		AGE GROUP					
	Cases	Deaths	Cases	Deaths	1·5	5·15	15·25	25·35	35·45	45·65
BLUE NILE	51	19	9	2	—	10	20	19	8	3
DARFUR	5	—	—	—	—	2	2	—	1	—
EQUATORIA	13	—	—	—	1	6	1	3	2	—
KASSALA	122	22	21	4	12	30	40	48	7	6
KHARTOUM	5	—	—	—	—	—	1	3	—	1
KORDOFAN	13	3	—	—	—	—	6	7	—	—
NORTHERN	3	—	—	—	—	—	3	—	—	—
UPPER NILE	4	—	—	—	—	—	3	1	—	—
TOTALS	216	44	30	6	13	48	76	81	18	10

The racial distribution of these cases was : Sudanese (Arab) 131, Sudanese Negroid) 103, Abyssinian 11, and Somali 1.

TABLE 11.

Sudan 1946

Leishmaniasis : Results of Treatment in the Last Six Years.

YEAR	Apparently cured %	Died %	Still under treatment %	Untreated or lost sight of %
1941	47.4	28.9	11.1	12.6
1942	47.0	30.0	12.0	11.0
1943	41.0	25.0	20.5	13.5
1944	43.0	30.0	2.0	25.0
1945	49.0	24.0	15.0	12.0
1946	74.4	7.3	11.1	7.2

In 1946 sodium antimony gluconate was used extensively in treatment.

8. LEPROSY.

There was no significant change in the incidence of this disease. Further surveys were made in the Southern Sudan where they can often be combined with sleeping sickness inspections.

Some progress was made in the establishment of village settlements.

TABLE 12.

Leprosy : Distribution in the Sudan.

PROVINCE.	Under Treatment in Camps or Settlements.	Under Observation and treatment in Hospital or as outpatients.	Total under treatment.	Under Observation but not under treatment.	Total Cases.
Blue Nile	47	3	50	86	136
Darfur	36	2	38	—	38
Equatoria	265	46	311	2,583	2,894
Kassala	37	—	37	2	39
Khartoum	15	33	48	6	54
Kordofan	74	12	86	92	178
Northern	—	5	5	7	12
Upper Nile	—	3	3	—	3
TOTALS ..	474	104	578	2,776	3,354

9. MALARIA.

There were 16,515 cases admitted to hospital with 213 deaths as contrasted with 14,007 cases with 195 deaths in 1945.

The increase in admissions to hospital is mainly accounted for by the cases occurring in Kordofan and Darfur Provinces ; although vast areas were inundated along the Nile by the highest recorded flood and some 120,000 people, highly susceptible to malaria, were rendered homeless in the Northern and Khartoum Provinces, the destruction of mosquitoes in all phases of their development was so effective that no epidemic occurred.

At the same time, however, there was increased seasonal incidence to the west of the Nile and particularly in Kordofan Province.

The control of mosquito breeding was closely maintained throughout the irrigated area of the Gezira and the many pump schemes along the Nile. Mepacrine was used extensively in treatment and suppressively in certain districts among special categories of people; paludrine was brought into use both in treatment and in prophylaxis.

Admissions to, and deaths in, hospital were :—

PROVINCE	Admissions	Deaths
Blue Nile	4,137	62
Darfur	1,127	5
Equatoria	1,869	23
Kassala	2,048	18
Khartoum	976	10
Kordofan	3,804	56
Northern	1,781	25
Upper Nile	773	14
TOTALS	16,515	213

TABLE 13.

Percentage Spleen Rates in Children of Intermediate and Village Schools

Province and Districts	Percentage Spleen Rate				
	1942	1943	1944	1945	1946
BLUE NILE PROVINCE.					
Gezira Districts	18.3	26.4	26.0	33.1	40.6
White Nile Districts	36.0	25.0	26.0	35.0	28.2
Fung Districts	41.9	27.0	?	35.4	33.0
DARFUR PROVINCE	35.9	32.1	29.3	32.0	33.0
EQUATORIA PROVINCE	43.2	18.9	43.0	45.0	44.0
KASSALA PROVINCE.					
Port Sudan District	1.8	2.1	2.4	2.0	6.0
Kassala District	20.5		40.0	21.0	28.0
Gedaref District	—	27.1	50.0	21.0	28.0
KHARTOUM PROVINCE	1.4	1.7	1.1	2.0	0.0
NORTHERN PROVINCE	7.0	5.5	11.2	16.2	24.0
KORDOFAN PROVINCE	24.1	38.7	19.1	14.0	45.4
UPPER NILE PROVINCE	18.8	12.0	11.7	10.1	36.0

The increased incidence in Kordofan is reflected in the rise in spleen rate from 14 to 45.

10. RABIES.

The number of persons receiving anti-rabic treatment was 1011 as contrasted with 63 in 1945.

Seventeen deaths were reported in 1946 and nine in 1945.

TABLE 14.

Rabies and Anti-Rabic Inoculations: Cases Recorded in the last ten Years

Year	Persons Treated	Deaths after Treatment	Total Deaths.
1937	534	6	11
1938	557	1	8
1939	422	8	16
1940	352	1	3
1941	407	7	14
1942	396	1	11
1943	358	—	7
1944	272	—	4
1945	63	—	9
1946	1011	4	17

Certain data regarding cases are given in Table 15.

TABLE 15.

Human Rabies: Details of Cases.

Locality	Case		Bite			No. of days after bite when treatment was begun	No. of injections given	No. of days from bite to fatal termination
	Age	Sex	Animal	Site	Severity			
KORDOFAN.								
Rahad	12	M	Dog	Hand	Severe	30 days	2	32
Abu Haraz	40	M	,,	Foot	,,	6 months	5	185
Nahud	4	M	,,	L. Sh.	,	1 month	13	43
Karko	40	F	,,	Arm	Not ,,	—	—	40
DARFUR.								
Geneina	27	M	,	Forearm	Moderate	Immediate	14	222
Nyala	70	F	,,	(L. Middle finger	,,	,,	14	18
NORTHERN.								
Abu Deleig	40	F	,,	Untraced	not known	40	3	43
Darmali	15	M	,,	Leg	,, ,,	300	—	300
KHARTOUM.								
Soba R. D.	60	F	,,	R. Arm	Small	2	14	30
EQUATORIA.								
Juba	12	M	No History	Not Known	—	—	—	?
Rumbek	9	M	Dog	Leg	Moderate	Immediate	6	80
,,	30	F	,,	Knee	Not Known	—	—	45
Li Rangu	32	?	,,	Leg	Moderate	2	14	32
BLUE NILE.								
Medani	8	M	Dog	Leg	Severe	—	—	31
Tendelti	22	M	,,	,,	Superficial	—	—	52
Abu Rukba	10	M	,,	L. Hand	—	—	—	212
Gulli	60	F	,,	Face	Deep Lesion	—	14	27

11. ACUTE RHEUMATISM

There were 196 cases, reported as acute rheumatism, admitted to hospital as compared with 280 in 1945.

There were two deaths in hospital in 1946 among these cases.

TABLE 16.

Acute Rheumatism

Incidence in the last ten years.

YEAR	Cases	Deaths
1937	274	2
1938	292	4
1939	303	4
1940	223	3
1941	356	1
1942	136	—
1943	190	3
1944	281	2
1945	280	2
1946	196	2

The distribution by Provinces was :—

PROVINCE	Cases
Blue Nile	38
Darfur	15
Equatoria	7
Kassala	12
Khartoum	27
Kordofan	18
Northern	74
Upper Nile	5
TOTAL	196

12. SCHISTOSOMIASIS.

Schistosomiasis continued to be one of the major public health problems of the Sudan.

In the Merowe and Dongola Districts of the Northern Province routine examination of schoolboys and of patients attending hospital and dispensary showed an increase in incidence of S. Haematobium from 3.3 per cent. to 7.6 per cent. No change in incidence was, however discovered in the Halfa District.

TABLE 17.

Merowe and Dongola Districts

Incidence of S. Haematobium Infection.

YEAR	Number Examined	% Infected
1943	17,445	3.5
1944	27,309	4.4
1945	12,146	3.3
1946	12,124	7.6

TABLE 18.

Schistosomiasis.

Halfa District: Incidence of S. Haematobium Infection.

YEAR	Number Examined	% Infected
1943	7,201	17.5
1944	6,873	18.2
1945	4,169	19.8
1946	5,456	20.0

In the irrigated area of Zeidab, in the Northern Province, there was no evidence of change in the incidence of S. Mansoni.

Examination disclosed a diminution in incidence for both forms of the disease among the people living along the White Nile reservoir above the Jebel Aulia Dam.

In the Gedaref District of Kassala Province 160 new cases were found ; they were probably due to the infection of water impounded in " hafirs " by labourers wandering from the Western Sudan into the Mechanical Crop Production Scheme. Active measures were taken to control the disease and to protect the water supplies.

In the Gezira area, where there had been some evidence of an increase in incidence among the indigenous population both in the vesical and rectal forms of the disease, a survey on a large scale was carried out. The evidence, so far collected, shows a patchy distribution of the disease within the area ; the absolute number of cases of schistosomiasis haematobium found was smaller than in 1945 but that of S. Mansoni greater ; however the percentage incidence of both forms was lower than in 1945. Extra staff have been seconded for special survey work and it is clear there is much work to be done in collecting information ; meanwhile the asscertainment of cases, their treatment, and the destruction of infected snails in known stretches of canal was intensified to the utmost.

Routine examination of natives living in the Gezira area by the methods practised there for some years did not show any increase in incidence of either form of the disease.

TABLE 19.

Schistosomiasis.

Gezira : Incidence in the Indigenous Population

YEAR	S. HAEMATOBIUM						S. MANSONI					
	Children			Adults			Children			Adults		
	No.	Inf	%	No.	Inf	%	No.	Inf	%	No.	Inf	%
1944 ..	29,966	940	3.17	57,196	511	0.89	—	—	—	—	—	—
1945 ..	12,133	672	5.50	22,681	448	1.9	3,926	249	6.3	9,546	183	1 9
1946 ..	18,728	567	3.02	35,870	430	1.2	8,369	151	1.8	24,155	336	1.4

13. TRYPANOSOMIASIS.

There were 56 cases reported in Equatoria during the year as contrasted with 39 in 1945. The increase being due to a small out-break of 19 cases in the Yambio District; they were all "first stage" cases.

TABLE 20.

Trypanosomiasis

Incidence in the Last Ten Years.

YEAR	Yubu	Yambio	Yei	Kajo-Kaji	Meridi	Other Localities	Imported
1937 ..	63	1	2	23	—	—	—
1938 ..	106	—	—	4	—	—	—
1939 ..	103	—	—	6	—	—	—
1940 ..	80	—	—	—	—	—	1
1941 ..	69	—	—	1	47	—	8
1942 ..	48	—	—	2	25	—	—
1943 ..	60	—	8	1	9	—	3
1944 ..	37	—	35	—	4	4	—
1945 ..	16	1	19	—	—	3	—
1946 ..	21	19	16	—	—	—	—

Palpations carried out during the year numbered 417,013 and 6,500 gland punctures were made. The local outbreak in the Yei District is now under control and only 13 new cases were found.

Some "clearings" were planted with milinis grass, which appeared to deter, but not to prevent, the entry of flies. Other clearings were planted with paspalum notatum.

14. TUBERCULOSIS.

There had been a well-marked increase in the number of cases admitted to hospital in 1944 and 1945 but fewer cases were admitted in 1946. This decrease is mainly accounted for by the smaller number of cases of non-pulmonary tuberculosis occurring in the Southern Sudan. The highest incidence for both types of the disease was seen in the age groups 15-25 and 25-35 years. Cultivators, who form the great mass of the people of the Sudan, provided the greatest number of cases followed by the group classified as "indigent and unemployed."

TABLE 21.

Tuberculosis

Admissions to Hospitals in the Last Ten Years.

YEAR	Pulmonary	Non-Pulmonary	Totals
1937	488	395	883
1938	623	404	1027
1939	685	396	1081
1940	579	457	1036
1941	631	511	1142
1942	671	505	1192
1943	593	529	1122
1944	796	632	1428
1945	957	643	1600
1946	888	613	1501

TABLE 22.

Tuberculosis

Admissions to Hospitals in the Last Five Years Contrasted for the Northern and Southern Regions

	1942		1943		1944		1945		1946	
	Pul.	Non-Pul.	Pul.	Non-Pul.	Pul.	Non-Pul.	Pul.	Non-Pul.	Pul.	Non-Pul.
NORTHERN SUDAN. Admisions for T.B.	568	445	516	483	677	526	845	508	781	538
SOUTHERN SUDAN Admissions for TB.	103	60	77	46	119	106	112	135	107	75

TABLE 23.

Incidence

Pulmonary Tuberculosis

Analysis by Age—Groups of Hospital Admissions

Part of Country.	AGE GROUPS.															
	0-1		1-5		5-15		15-25		25-35		35-45		45-65		65 & Over	
	C	D	C	D	C	D	C	D	C	D	C	D	C	D	C	D
Northern Sudan	-	-	-	-	13	4	252	36	269	61	142	23	74	20	31	2
Southern Sudan	-	-	-	-	7	4	13	6	46	13	26	9	10	5	-	-

TABLE 24.

Occupational Incidence

Pulmonary Tuberculosis

Analysis by Occupation of Admissions ToHospitals in the Last Six Years.

Year	Prisoners	Cultivators	Nomads	Soldiers Sailors and Police	Townsmen			Servants	Indigent and Unemployed	Women not employed	Children	Unclassified	TOTAL
					Labourers	Artisans and Shopkeeper	Clerks						
1941	—	182	10	32	92	28	16	11	80	141	40	—	631
1942	—	239	—	21	61	32	5	17	34	123	8	131	671
1943	21	129	—	25	113	44	12	31	113	81	3	21	593
1944	—	171	—	47	132	25	25	15	165	159	12	45	796
1945	—	191	7	41	159	65	21	25	170	197	25	56	957
1946	—	216	35	40	66	40	23	34	175	172	11	76	888

Table 25.

Age Incidence

Non-Pulmonary Tuberculosis.

Part of Country	AGE GROUPS							
	0·1	1·5	5-15	15·25	25·35	35·45	45·65	65—over
Northern Sudan	1	31	96	109	148	83	50	20
Southern Sudan	1	5	10	17	25	15	2	—

Table 26.

Non-Pulmonary Tuberculosis : 1946.

Analysis by Site of Lesion of Hospital Admissions.

Part of Country	Gland	Bone	Joint	Other	Totals
Northern Sudan ..	191	147	89	111	538
Southern Sudan ..	37	23	11	4	75

15. TUMOURS.

Recorded cases numbered 745 and were classified as :—

Malignant :	carcinoma	117
,,	sarcoma	39
,,	Unclassified	84
,,	Total	240
Benign	.. ..	505
Total all Tumours	.. ..	745

Table 27.

Tumours

Incidence in the Last Six Years.

Northern Sudan

Year	Malignant	Non-Malignant	Total
1941	221	264	485
1942	164	205	369
1943	291	457	748
1944	217	664	881
1945	211	280	491
1946	189	295	484

Southern Sudan

Year	Malignant	Non-Malignant	Total
1941	34	61	95
1942	11	62	73
1943	6	34	40
1944	20	96	116
1945	70	107	177
1946	51	210	261

16. UNDULANT FEVER.

There were 58 cases reported with 3 deaths contrasted with 70 cases and two deaths in 1945.

TABLE 28.

Undulant Fever.

Incidence in the Last Ten Years.

Year.	Cases	Year.	Cases
1937	33	1942	17
1938	28	1943	55
1939	29	1944	66
1940	43	1945	70
1941	31	1946	58

17. VENEREAL DISEASES.

There was no significant change in the incidence of these diseases.

There were 119,047 cases reported as compared with 108,467 in 1945.

Syphilis was prevalent in Darfur Province and in the Southern part of Kordofan Province—rural tribal areas—while gonorrhoea was more commonly seen in the towns. No soldier was allowed to go home on leave or demobilization unless certified to be free of the venereal diseases.

The distribution by Provinces was :

PROVINCE.	Cases.
Blue Nile	18,728
Darfur	16,336
Equatoria	8,448
Kassala	19,313
Khartoum	9,348
Kordofan	29,529
Northern	7,949
Upper Nile	9,396
TOTAL	119,047

CHAPTER V.

PUBLIC HEALTH

1. QUARANTINE

26,563 persons entering the Sudan at Wadi Halfa were examined. The following cases of disease were found amongst them :—

Schistosomiasis	97
Malaria	116
Relapsing Fever	17
Tuberculosis, pulmonary	14
Smallpox	1
Chickenpox	43
Syphilis	2

Labourers imported by contractors were medically examined, deloused, vaccinated and, if proceeding south of the 15°N., inoculated against yellow fever. Cases of Schistosomiasis were detained in the Quarantine for treatment. All trains, boats, road vehicles arriving in Halfa from the outh were inspected before entering the town.

The *aedes* index for Halfa was maintained at Nil throughout the year and *gambiae* control measures appear to have eradicated this mosquito from the Halfa area.

The Port Quarantine Service dealt with 461 ships entering Port Sudan and 558 native craft entering Flamingo Bay. Seventeen ships arrived at Port Sudan after a voyage of less than 6 days from a port in the yellow fever endemic area and the required measures were taken against these ships. No mosquitoes were found on board and no ship carried any case of communicable disease.

The two ship searchers inspected 303 ships for rats and mosquitoes. No unusual rat mortality was found in ships coming from plague infected ports. The system of radio pratique in abeyance during the war was re-instituted in 1946.

The quarantine service at Suakin dealt with 1,663 Sudanese and ,6544 Westerners going on the pilgrimage. These 8,207 pilgrims left in September and October. All pilgrims were deloused with D.D.T. powder, inoculated against cholera and vaccinated against smallpox.

The pilgrimage was declared clean and the quarantine period for returning pilgrims fixed at 3 days in Suakin. The Sudan Medical Mission accompanied the pilgrimage.

In the Port Sudan Area, 143 dhows were fitted with 237 mosquito proof fresh water containers and thereby reduced considerably the possibility of importing aedes aegypti mosquitoes into the area.

Measures to combat the transport of mosquitoes by air, land, river or seacraft were carried out as in previous years at Wadi Halfa, Port Sudan, Khartoum, Malakal and Juba.

TYPE OF CRAFT.

	LAND		SEA OR RIVER		AIR	
	Total Insp.	No. of Adult Mosq. found	Total Insp.	No. of Adult Mosq. found	Total Insp.	No. of adult Mosq. found
Wadi Halfa ..	269	0	5,577	0	147	0
Port Sudan ..	—	—	303	0	271	0
Khartoum	All trains from South	144	1,055	3	726	3
Malakal	—	—	117	0	613	0
Juba	—	—	73	0	1,509	0
Kosti	—	—	—	—	—	—

2. ANTI-NATAL AND MATERNITY SERVICE.

At Kassala Hospital anti-natal clinic 348 new cases were seen and of these 93 were found to need treatment (Albuminaria 31, malaria 32, anaemia 7, and Syphilis 23). Cases admitted to hospital for labour were 46, and of these one died —she had not attended the anti-natal clinic.

At Port Sudan there were 1,136 attendances and 411 new cases were seen in the three clinics (Hospital, Deim Medina and Deim Musa). In Kordofan Province, at the El Obeid clinic 738 new cases were seen and total attendances were 2,470. At Nahud clinic 237 new cases were seen, compared with 210 in 1945 when the clinic was first opened. At the 12 S.M.S. ante-natal clinics in Khartoum Province 3,235 new cases were seen contrasted with 5,643 in 1945.

23 midwives passed out of the Midwives' Training School Omdurman, and returned to their villages :

Blue Nile Province	7
Darfur Province	2
Kassala Province	1
Khartoum Province	7
Kordofan Province	2
Northern Province	4

3. INFANT AND CHILD WELFARE.

18,348 attendances, of which 5,284 were new cases, were reported from S.M.S. Child Welfare clinics in the Khartoum Area.

13,064 home visits were made and 2,562 children were vaccinated.

The infantile mortality per 1000 live births in Khartoum and Omdurman was :

	1945	1946
Khartoum	78	61.30
Omdurman	78	56.83

The total maternal mortality in Omdurman was 3.2 per 1000 births and 10 deaths in the Three Towns were due to puerperal sepsis.

The drop in the infantile mortality rate from 78 in Khartoum and Omdurman in 1945 to 61.30 in Khartoum and 56.83 in Omdurman in 1946 is so abrupt as to be startling. The figures are thought to be reasonably reliable but there may have been a combination of factors operating in 1946 that may well not be repeated.

In Khartoum Province S.M.S. Welfare centres were maintained at the Omdurman Midwives' School, at the Morada, in East and West Deims, Khartoum North, Kobar, Burri, Tuti Island, Halfayat el Meluk, Shambat, Deim Abu Said and Church Missionary Society Centres at C.M.S. Hospital, at Abu Ruf, Beit el Mal, Wad Nubawi and Abu Kaduk.

Table 29.

KHARTOUM PROVINCE : 1946.

• *Infants and Children seen at Centres and by Home Visitors.*

Centre	Seen at Centre		Total	Referred to Hospital	Vaccinations
	New	Old			
Omdurman	274	862	1,136	12	2,562
East Deims	269	472	741	91	—
West Deims	478	904	1,382	104	—
Khartoum North	276	528	804	113	—
Kobar	61	34	75	3	—
Burri	169	193	362	48	—
Tuti Island	209	244	453	7	—
Halfayat el Meluk	100	254	554	44	—
Shambat	97	180	277	76	—
Deim Abu Said	61	139	200	7	—
Totals	1,994	3,810	5,284	505	2,562

Church Missionary Society Child Welfare Centres.

Centres	Children seen at Home	Children seen at Clinic	Total
Abu Ruf	1,753	1,221	2,974
Beit el Mal	1,060	590	1,059
Wad Nubawi	575	459	1,034
Hospital	2,085	2,825	4,910
Abu Kaduk	640	4,552	5,192
Totals	6,113	9,656	15,769

Home visits.

AREA	No. of Homes	No. of Visits
Omdurman	1,547	10,169
Khartoum Deims	399	1,454
Khartoum North	100	357
Rural District	304	1,084
TOTALS	2,350	13,064

SUMMARY OF WORK DONE BY S.M.S.

Child Welfare Service and by the Church Missionary Society.

	Home Visits	Visits to Centres	TOTALS
Sudan Medical Service	13,064	5,284	18,348
Church Missionary Society	6,113	9,656	15,769
TOTALS	19,177	14,940	34,117

4. SCHOOL HEALTH.

Table 30 gives figures for the examination of school children in each province. No significant changes in the health of pupils were found.

In Equatoria the children in certain schools were divided into age groups, and the percentage of pupils in each age group suffering from Bilharzia Mansoni, ankylostoma and enlarged spleen was found to be :—

AGE GROUP	No. Examined	Bilharzia Mansoni	Ankylostoma	Enlarged Spleen
		per cent.	per cent.	per cent.
7— 9 years	482	5.3	10.1	55.8
10—12 ,, ...	892	6.7	11.0	59.7
13—15 ,, ...	1,198	8.3	10.0	46.7
16 ,, ...	1,036	6.7	9.3	33.0

The only significant feature appears to be the reduction in the percentage of enlarged spleens in the two older age groups.

TABLE 30

1946 ; HEALTH OF SUDANESE SCHOOL CHILDREN

The following table shows the results of the medical eximination :

PROVINCE AND DISTRICT.	No. Examined %	Trachoma %	Bilharzia %	Spleen %	Pul. T.B. %	Ankylostomiasis %
Blue Nile Province.						
WAD MEDANI.						
2 Boys Intermediate	248	17.7	.1	4. 8	—	—
2 Girls Intermediate	256	49.0	—	2. 7	—	—
10 Boys Elementary	1,881	34.4	1.1	13. 9	—	—
2 Girls Elementary	226	27.8	—	8.89	—	—
19 Sub-Grade and Khalwas ...	957	28.4	1.4	31. 9	—	—
	3,568					
ABU USHER.						
3 Boys Intermediate	284	11.6	1.0	13.0	—	—
11 Boys Elementary	1,855	24.6	4.6	18.0	—	—
4 Girls Elementary	499	22.0	—	18.4	—	—
15 Sub-Grade	1,458	21.3	2.9	17.9	—	—
	4,093					
WHITE NILE.						
Bakt Er Ruda College ...	128	7.8	13.3	7.8	—	—
Boys Intermediate	251	24.7	8.7	14.3	—	—
Boys Elementary	976	21.7	1.6	15.0	—	—
Girls Elementary	358	20.6	—	26.5	—	—
Sub-Grade and Khalwas ...	823	41.3	5.4	28.9	—	—
	2,536					
SENNAR.						
2 Boys Elementary	339	28.9	.58	20.6	—	—
1 Girls Elementary	29	27.6	—	24.1	—	—
7 Sub-Grade	409	23.4	5.1	44.9	—	—
	777					
SINGA.						
2 Boys Elementary	237	4.2	—	7.1	—	—
1 Girls Elementary	196	8.1	—	16.3	—	—
6 Sub-Grade	929	19.9	.75	41.3	—	—
	1,362					
ROSEIRES.						
1 Boys Elementary	160	11.2	—	31.2	—	—
1 Girls Elementary	60	13.3	—	41.6	—	—
1 Sub-Grade	53	47.1	—	60.3	—	—
	273					
Darfur Province.						
6 Boys Elementary	1,005	25.0	24.0	32.0	—	—
1 Ahlia Intermediate	82	12.0	40.0	26.0	—	—
3 Girls Elementary	201	30.0	3.0	15.0	—	—
Sub-Grades and Khalwas ...	784	38.0	38.0	32.0	—	—
	2,072					
Kassala Province.						
BEJA DISTRICT (*Southern Part*).						
1 Boys Elementary	105	18.1	—	6.7	—	—
3 Boys Sub-Grade	117	29.1	1.7	22.2	—	—
5 Boys Khalwas	196	17.9	—	36.7	—	—
	418					

PROVINCE AND DISTRICT.	No. Examined	Trachoma %	Bilharzia %	Spleen %	Pul. T.B. %	Aknylostomiasis %
Kassala Province—*Contd.*						
KASSALA DISTRICT.						
4 Boys Elementary	491	16.5	—	26.1	—	—
3 Boys Sub-Grade	131	33.1	—	20.6	—	—
1 Girls Elementary	85	15.3	—	14.1	—	—
	707					
GEDAREF DISTRICT.						
3 Boys Elementary	346	11.8	2.3	38.7	—	—
7 Boys Sub-Grade	366	11.7	—	18.0	—	—
	712					
Kordofan Province:						
EASTERN KORDOFAN.						
2 Boys Elementary	375	5.6	16.0	12.7	—	—
2 Girls Elementary	183	7.3	8.1	14.5	—	—
2 Sub-Grade	179	4.4	16.2	8.4	—	—
	737					
NORTHERN KORDOFAN						
2 Boys Elementary	321	10.2	0.6	46.4	—	—
1 Girls Elementary	107	15.8	—	18.6	—	—
1 Sub-Grade	94	13.8	—	13.8	—	—
	522					
WESTERN KORDOFAN						
4 Boys Elementary	762	5.77	2.1	56.03	—	—
1 Girls Elementary	130	12.3	3.85	30.77	—	—
11 Sub-Grade	759	17.52	4.74	40.31	—	—
3 Khalwas	112	6.25	—	54.46	—	—
	1,763					
EASTERN JEBELS.						
5 Boys Elementary	726	5.6	39.5	60.6	—	—
2 Girls Elementary	115	9.5	27.6	20.0	—	—
3 Sub-Grade	405	10.12	37.3	72.6	—	—
	1,246					
WESTERN JEBELS.						
1 Intermediate School	41	21.9	12.2	39.1	—	—
3 Elementary Schools	398	9.18	34.9	58.5	—	—
1 Sub-Grade School	98	9.1	33.6	45.9	—	—
	537					
Khartoum Province.						
7 Higher Schools	101	2.9	—	—	—	—
9 Secondary Schools	1,057	7.2	—	—	—	—
17 Intermediate Schools	1,925	15.1	—	0.3	—	—
66 Elementary Schools	7,279	16.9	—	2.3	—	—
2 Technical Schools	91	31.8	—	3.3	—	—
1 Maahad Ulama	250	32.4	—	3.2	—	—
61 Khalwas	3,817	20.3	—	2.3	—	—
	14,520					
Port Sudan.						
5 Intermediate	994	3.5	—	2.0	—	—
4 Boys Elementary	853	14.2	—	2.1	—	—
1 Girls Elementary	68	2.9	—	—	—	—
	1,915					

PROVINCE AND DISTRICT.	No. Examined	Trachoma %	Bilharzia %	Spleen %	Pul. T.B. %	Aknylotomiasis %
Upper Nile Province.						
2 Intermediate Schools	149	3.0	—	22.0	—	—
3 Elementary	406	27.0	2.0	23.0	2.0	—
	555					
Northern Province.						
ATBARA.						
3 Intermediate	288	12.0	2.0	1.7	—	—
13 Boys Elementary	2,675	19.0	2.7	4.0	—	—
2 Girls Elementary	216	34.2	—	—	—	—
12 Subgrade and Khalwas ...	2,142	26.8	1.1	5.1	—	—
	5,321					
WADI HALFA.						
1 Intermediate	155	44.0	84.0	77.0	—	—
4 Boys Elementary	1,038	50.0	24.0	1.0	—	—
4 Girls Elementary	295	50.0	2.0	4.0	—	—
5 Sub-Grade	473	60.0	12.0	4.0	—	—
33 Khalwas	1,316	55.0	19.0	3.0	—	0.5
	3,277					
DONGOLA.						
1 Intermediate	133	43.6	6.7	3.7	—	—
4 Boys Elementary	669	39.7	10.0	7.6	—	—
2 Girls Elementary	146	63.7	1.3	6.8	—	—
14 Sub-Grades and Khalwas ...	783	33.3	8.6	5.8	—	—
	1,731					
MEROWE.						
6 Boys Elementary	707	41.4	4.5	5.5	—	—
3 Girls Elementary	187	5.5	5.5	0.5	—	—
15 Sub-Grade and Khalwas ...	740	39.8	4.4	0.5	—	—
	1,634					
Equatoria Province.						
ZANDE DISTRICT	1,051	0.09	14.7	41.5	—	13.4
WAU DISTRICT	1,101	0.89	5.9	61.0	—	10.9
CENTRAL DISTRICT	204	1. 4	3.4	55.4	—	16.6
YEI DISTRICT :						
Yei...	230	20.8	13.4	37.8	—	134.0
EASTERN DISTRICT :						
Malingaro	62	12.9	—	61.2	—	—
INTERMEDIATE.						
TORIT DISTRICT :						
Okaru	148	—	2.7	32.4	—	4.0
WAU DISTRICT :						
Bussere	271	—	0.7	66.0	—	9.9
YEI DISTRICT :						
Mugent School, Loka	98	3.0	7.1	14.2	—	8.9

5. RURAL HEALTH.

Seventeen new village dispensaries were opened during the year and, at the 343 dispensaries scattered throughout the Sudan, there were 5,468,187 out-patient attendances.

Further steps were taken to extend the nature of the work carried out so that the dispensaries may develop into " health centres." Local authorities and village councils took an increasing interest in their own dispensaries.

6. NUTRITION.

The Central Committee was reconstituted to include representatives of the Administrative and Veterinary Services of the Departments of Agriculture and Education.

The Local Committee in Equatoria continued its investigations particularly into methods to popularise the cultivation and consumption of soya beans.

A pamphlet prepared by Dr. Corkill entitled the " Feeding of Sudanese Infants " was printed and distributed.

7. LEGISLATION.

Given below is a *resume* of the legislation affecting health enacted during the year :—

1. The Penal Code and the Code of Criminal Procedure (Amendment) Ordinance 1946 (1946 Ordinance No. 3) prohibited any form of female circumcision other than the lawful form.

2. The notifiable Diseases (Khartoum Province) Order 1946 (1946 L.R.O. No. 21) ordered that the following communicable diseases, included in class " B " of part IV of the Public Health Ordinance 1939, be notifiable throughout Khartoum Province :

Measles, mumps, scarlet fever, undulant fever, whooping cough and leprosy.

3. The Poisons (Amendment) Regulations 1946 (1946 L.R.O. No. 37) prohibited the sale by retail of the following poisons in part 2 of the Poisons List except on a prescription given by a licensed medical practitioner in a form prescribed by the Director, Sudan Medical Service :—

(a) Barbituric acid ; its salts or derivatives, in any form, whether compounded with any other substance or not ;

(b) All medical sulphonamides and sulphones.

These regulations also forbid any person to be in possession of any medical sulphonamides or sulphones except upon lawful authority, the proof of which shall be upon him.

4. The Poisons (Amendment) Order 1946 (1946 L.R.O. No. 38) added " Pethidine " to part 1 of the Poisons List.

5. The Pharmacy and Poisons (Amendment) Ordinance 1946 (1946 Ordinance No. 10) made it unnecessary for the owner of a pharmacist's business to be :—

(a) Licenced under Section 3 of this Ordinance provided that :

(i) the business is under the sole management and control of a licensed pharmacist ;

(ii) in the case of a firm a copy of the certificate of registration and in the case of a company a copy of the certificate of incorporation is lodged with the Board ; and

(iii) the other provisions of the Ordinance are complied with ;

(b) Such an owner shall also be an authorised seller of poisons, if his business is conducted in accordance with the above provisions.

6. The Prohibited and Restricted Goods Ordinance (Amendment of Schedule) Order 1946 entirely prohibited transport, sale and manufacture of vessels or utensils intended for use or capable of being used in the preparation, storage, serving, or consumption of food or drink which are coated with material containing a greater proportion of lead than one percent.

This Ordinance also prohibited the import of shaving brushes and bristles for making shaving brushes except under licence from the Director, Sudan Medical Service.

8. HEALTH IN PROVINCES.

(a) BLUE NILE PROVINCE.

Area	54,755 sq.m.	Population	1,586,450
Beds	1,179	Per 10,000 population	7
Inpatient admissions	18,874	,, ,, ,,	119
Out-patient attendances	2,092,296	,, ,, ,,	13,188
Vaccinations	30,315	,, ,, ,,	191

TABLE 31.

Medical and Health Staff.

CATEGORY	British	Sudanese	Total
Doctor	6	14	20
Nursing Sister	2	—	2
Medical Assistant	—	99	99
Hospital Attendant	—	583	583
Public Health Inspector	2	—	2
Public Health Officer	—	9	9
Sanitary Overseer	—	21	21
Mosquito man	—	201	201

TABLE 32.

Blue Nile Province.

Work in Hospitals and Dispensaries.

UNIT.	Beds	Inpatient Admissions	Operations	Outpatient Attendances
Wad Medani Hospital	297	6,603	809	126,262
,, ,, Dispensary	58	—	—	421,361
Abu Usher Hospital	178	3,371	559	12,566
,, ,, Dispensary	4	—	—	518,796
Kosti Hospital	130	2,726	262	91,880
,, Dispensary	8	—	—	247,623
Dueim Hospital	59	1,779	267	81,266
,, Dispensary	8	—	—	189,484
Sennar Hospital	144	1,401	220	47,557
,, Dispensary	12	—	—	127,164
Roseires Hospital	102	902	151	16,851
,, Dispensary	69	656	72	74,282
Singa Hospital	110	1,436	173	31,474
,, Dispensary	—	—	—	105,730
TOTALS	1,179	18,874	2,513	2,092,296

Rain grown crops, yielded good harvests.

The number of cases of relapsing fever reported in the Province fell from 4,698 in 1945 to 462 in 1946.

The special schistosomiasis survey of the Gezira area was continued throughout the year ; so far it has been found that both forms of the disease exist in varying relative proportions in different blocks of the irrigated area but, so far, the contributory factors have not been established.

Malaria showed a moderately high incidence, particularly in the White Nile Area.

TABLE 33.

Schistosomiasis in the Indigenous Population.

Gezira Irrigated Area : Percentage Incidence Annually 1944-46.

(*Figures from routine examinations of natives*).

YEAR	GROUPS.								
	Children			Adults			All Ages		
	Numb.	Infec.	%	Numb.	Inf.	%	Numb.	Infec.	%
S. haematobium									
1944 ..	29,966	940	3.17	57,196	511	0.89	—	—	—
1945 ..	12,133	672	5. 5	22,681	448	1. 9	—	—	—
1946 ..	18,728	567	3.02	35,870	430	1. 2	—	—	—
S. mansoni									
1944 ..	—	—	—	—	—	—	—	—	—
1945 ..	3,926	249	6.3	9,546	183	1.9	—	—	—
1946 ..	8,369	151	1.8	24,155	336	1.4	—	—	—

(b) DARFUR PROVINCE.

Area	138,150 sq.m.	Population	829,724
Beds	321	Per 10,000 Population	3
Inpatient admissions	11,884	,, ,, ,,	143
Outpatient attendances	425,803	,, ,, ,,	5,131
Vaccinations	169,000	,, ,, ,,	2,036

TABLE 34.

Medical and Health Staff.

CATEGORY	British	Sudanese	Total
Doctor	2	3	5
Nursing Sister	—	—	—
Medical Assistant	—	20	20
Hospital Attendant	—	107	107
Public Health Inspector	—	—	—
Public Health Officer	—	1	1
Sanitary Overseer	—	2	2
Mosquito man	—	65	65

TABLE 35.

Darfur Province.

Work in Hospitals and Dispensaries.

UNIT	Beds	Inpatient Admissions	Operations	Outpatient Attendances
El Fasher Hospital	159	2,878	414	127,132
Geneina Hospital	52	1,351	242	24,162
Nyala Hospital	54	776	218	41,710
Dispensaries	56	6,879	—	232,799
TOTALS	321	11,884	874	425,803

The rains were good and well spaced and the crops were plentiful ; the people were well nourished and their health remained satisfactory.

There were no major epidemics. Sporadic cases of relapsing fever occurred, but the generalised use of D.D.T. powder prevented any major outbreak. An interesting case of human rabies occurred.

The patient had been bitten in December 1945, and received a full course of anti-rabic vaccine. He was admitted in July 1946 as a typical case of hydrophobia and died five days after admission. Five cases of kala-azar were treated with neostibosan and sodium antimony tartrate, with good results.

27 cases of tuberculosis (6 non-pulmonary) were admitted to hospital. The number of lepers increased by one to 38. The health of school children showed no significant change ; the percentage spleen rate for all school children was 30.1 %.

(c) EQUATORIA PROVINCE.

Area	159,025 sq.m.	Population ..	1,305,467
Beds	2,034	Per 10,000 population ..	15
Inpatient admissions ..	30,851	,, ,, ,, ..	2,236
Outpatient attendances ..	910,102	,, ,, ,, ..	6,986
Vaccinations	76,316	,, ,, ,, ..	585

TABLE 36.

Medical and Health Staff.

CATEGORY	British	Sudanese	Total
Doctor	6	13	19
Nursing Sister	2	—	2
Medical Assistant	—	41	41
Hospital Attendant	—	263	263
Public Health Inspector	1	—	1
Public Health Officer	—	—	—
Sanitary Overseer	—	14	14
Mosquito man	—	79	79

TABLE 37.

Work in Hospitals and Dispensaries.

UNIT	Beds	Impatient Admissions	Operations	Outpatient Attendances
Juba Hospital	349	6,276	747	58,591
Juba ,, (incl. Quar.) Dispensaries	40	2,048	—	71,108
Kapoeta Hospital	46	784	104	10,403
Kapoeta Dispensary	30	593	—	34,797
Torit Hospital	88	3,038	148	36,774
Torit Dispensary	48	363	—	95,432
Li Rangu Hospital (*including Quarantine*)	90	1,095	387	24,423
Li Rangu Dispensary	105	1,637	—	65,642
Source Yubo Hospital	76	1,024	110	14,010
Source Yubo Dispensary	168	1,292	38	20,473
Meridi Hospital	100	807	160	20,048
Meridi Dispensary	112	133	—	20,595
Yei Hospital	79	1,421	89	36,507
Yei (incl. Kajo Kaji) Dispensary	50	1,187	—	115,250
Rumbek Hospital	176	1,603	136	24,087
Rumbek Dispensary	152	567	—	61,984
Wau Hospital	231	2,945	776	29,785
Wau Dispensary	88	3,401	—	65,280
C.M.S. Lui Hospital	—	249	193	21,296
C.M.S. Lui Dispensary	—	388	—	83,617
TOTALS	2,034	30,851	2,888	910,102

Crops were moderately good, but sufficient grain is not yet grown to supply the province and grain was imported from the north. Soya bean cultivation showed a slight increase.

Experimental cultivation of sugar cane in the Zande District gave excellent results.

The main feature as regards epidemic disease was the drop in the number of cases of cerebrospinal meningitis admitted to hospital from 1,128 in 1945 to 566 in 1946.

In the Wau area 3,503 cases were seen in 1945 and only 144 in 1946.

No case of relapsing fever occurred.

57 cases of Alastrim were seen, with one death.

It was found that leptospira ictero-haemorrhagica was not the cause of the epidemic jaundice that occurred in the Lakes and Central District.

Ankylostoma, bilharzia of the mansoni type, and guinea worm formed the major public health problems of the Province.

A retired sanitary overseer, who is now a chief in the Moru District, began an experiment to test the value of pit latrines in the prevention of the spread of Akylostoma. A census was made of his people and all have been examined and treated for ankylostoma. In half of the villages pit latrines have been dug and in the other half they have not. After a year a re-examination of the people of both sections will be made.

The incidence of Bilharziasis Mansoni and of dracontiasis remained unchanged.

Further steps were taken to protect wells and other forms of water supplies in addition gambusia fish were used in wells and pools to control cyclops.

13 cases of Kala-Azar and 40 cases of hydatid disease occurred in the Eastern District of the province.

56 cases of Sleeping Sickness were found, 53 being new infections.

The B.E.L.R.A. leprosy lay-worker, carried on the work of establishing village leper settlements in the Moru Area.

(d) KASSALA PROVINCE.

Area	134,450 sq.m.	Population	597,530
Beds	838	Per 10,000 population	14
Inpatient admissions	12,783	,, ,, ,,	214
Outpatient attendances	902,313	,, ,, ,,	15,100
Vaccinations	53,711	,, ,, ,,	898

TABLE 38.

Medical and Health Staff

CATEGORY	British	Sudanese	Total
Doctor	3	7	10
Nursing Sister	2	—	2
Medical Assistant	—	32	32
Hospital Attendant	—	202	202
Public Health Inspector	1	—	1
Public Health Officer	—	2	2
Sanitary Overseer	—	9	9
Mosquito man	—	111	111

TABLE 39.

Kassala Province

Work in Hospitals and Dispensaries

UNIT	Beds	Inpatient Admissions	Operations	Outpatient Attendances
Port Sudan Hospital	212	3,345	215	106,125
Port Sudan Dispensary	35	431	—	134,228
Port Sudan and Suakin Quarantine Hospital	41	91	—	479
Port Sudan Central Prison Hospital ..	37	157	—	13,570
Kassala Hospital (inc. Quarantine and Prison)	212	3,944	474	148,654
Kassala Dispensaries	40	694	—	192,894
Gedaref Hospitals*(2) (including Quarantine and Prison)	226	3,818	302	127,953
Gedaref Dispensaries	35	303	—	178,410
TOTALS	838	12,783	991	902,313

* There are civil and military hospitals.

Southern Area.

The Gash flood was one of the largest on record, being the fourth highest since 1925. About 11,383 feddans were sown with dura in the irrigated area and another 30,000 feddans flooded with escape water were also made available for dura cultivation. In the Mechanical Crop Production Scheme in the Gedaref area, about 8,000 tons of grain were harvested.

There was a reduction in the incidence of relapsing fever. In Kassala Area there was one case as compared with 83 cases and 2 deaths in 1945 and in Gedaref Area 31 cases with 2 deaths were reported as compared with 265 cases with 5 deaths in 1945.

There were 28 cases of diphtheria ; 27 were treated in hospital but one case, the wife of a British Official, was treated in the house. (It is of interest that ten years ago the wife of a British Official living in the same house contracted this disease).

There were only two cases of cerebrospinal meningitis.

Schistosomiasis and dracontiasis constitute a problem of first importance in preventive medicine in Gedaref Area. Re-examination of the people of those villages found infected with bilharzia in 1945 was carried out but had not been completed by the end of 1946. Fresh foci were found and it is thought that the disease has been introduced into one of them by Fellata within the last two years.

Howata appeared to be the centre of guinea worm infection. Control measures such as the use of gambusia, special watering points with guards, and filtration of water through cloth under supervision at the time of collection have been inaugurated.

In Gedaref Area 127 cases of Kala-azar were diagnosed as contrasted with 68 in 1945.

There was an increase in the incidence of Tuberculosis, 50 cases of the pulmonary form of the disease were admitted to Kassala Hospital as opposed to 25 in 1945. Gedaref figures were 37 and 24 respectively.

Northern Area (Port Sudan).

19,200 feddans of grain were cultivated in the Tokar area, but locusts reduced a potentially good harvest by a third.

There was no serious epidemic of infectious disease.

Amoebic dysentery continued to be prevalent and 2,045 cases were diagnosed in the area.

No primary cases of malaria were discovered in Port Sudan during the year.

Total mosquito infections found in Port Sudan Area in 1946 were 298 Culex spp., 259 Aedes Aegypte and 33 Anopheles spp.

2,127 rats were caught, the average flea count being 0.5 per rat. About half the rats caught were Rattus Rattus Frugivorous.

461 ships entered the port as compared to 384 in 1945. No cases of quarantine disease occurred.

(e) KHARTOUM PROVINCE.

Area	5,700 sq.m.	Population	..	329,014
Beds	890	Per 10,000 population	..	27
Inpatient admissions ..	13,502	,, ,, ,,	..	410
Outpatient attendances ..	1,172,838	,, ,, ,,	..	35,647
Vaccinations	30,244	,, ,, ,,	..	919

TABLE 40.

Medical and Health Staff.

CATEGORY.	British	Sudanese	Total
Doctor	9	18	27
Nursing Sister	9	—	9
Medical Assistant	—	22	22
Hospital Attendant	—	468	468
Public Health Inspector	2	—	2
Public Health Officer	—	2	2
Sanitary Overseer	—	15	15
Mosquito man	—	102	102

TABLE 41.

Khartoum Province

Work in Hospitals and Dispensaries

UNIT	Beds	Inpatient Admissions	Operations	Outpatient Attendances
Khartoum Civil Hospital (including South Block)	323	4,803	1,036	149,025
Omdurman Civil Hospital	235	4,124	1,051	154,963
Khartoum Eye Hospital	110	1,199	1,886	88,436
Khartoum North Hospital (including Central Prison)	70	1,174	—	94,301
Omdurman Isolation Hospital	70	181	—	—
Province Dispensaries	12	183	—	633,925
C.M.S. Hospital	70	1,838	240	26,953
C.M.S. Dispensaries	—	—	—	25,235
TOTALS	890	13,502	4,213	1,172,838

Rain-fall was heavy and the Niles reached their highest recorded level.

No major epidemics occurred. Cases of relapsing fever showed a reduction from 862 in 1945 to 4 in 1946.

85,000 dustings of individuals with D.D.T. were carried out during the year

30,241 vaccinations against smallpox were made.

The number of cases of diphtheria showed a slight reduction. 155 children were immunised in the Um Gidad Area 5 miles east of Khartoum North where a serious local outbreak occurred in June and July. 36 cases were reported.

The incidence of Malaria was high ; a peak in September and October followed the heavy rains, nearly half of the cases occurring in these months. In spite of the record river flood and the widespread inundation the incidence of malaria fell rapidly in the last three months of the year.

In September and October public buildings and a number of private houses were sprayed with D.D.T. residual spray.

In the Three Towns 628 cases of malaria were notified as compared to 100 in 1945.

There was no marked change in the incidence of tuberculosis.

Fourteen cases of animal rabies were reported during the year, they occurred in all districts of the province and the province was therefore declared an infected area.

One case of human hydrophobia occurred despite early treatment with vaccine.

There was no marked change in the incidence of the dysenteries. Of the bacillary dysenteries that were notified, three were found to be of the Shiga type and one Schmitz.

There was a drop in the incidence of enteric fever, 37 cases locally infected were notified as contrasted with 59 in the previous year.

The Mental Diseases Board reported on 58 cases. A clinic was held twice weekly in Khartoum North by the Medical Officer in charge of this hospital and somatic measures of treatment have been carried out.

No schools were closed for outbreaks of communicable disease. 14,520 school children were examined during the year. 11 school momarida in the Three Towns were responsible for the carrying out of treatment prescribed for trachoma cases The percentage spleen rate was 1.9. No case of pulmonary tuberculosis was founds

The health of prisoners remained satisfactory except for an outbreak of 63 cases of food poisoning in the Central Prison. The prisoners affected were only those who had been issued with milk. A pure culture of staphylococcus aureus was isolated from a sample of the milk. With the cooperation of the Veterinary Department, an inspection of the cows and dairymen was carried out ; the source of infection was not, however, discovered.

19 native untrained midwives were taken into the Omdurman Midwives' School and given a short course in the principles and practice of asepsis, and in the management of normal cases. They were then licensed as second class midwives.

The C.M.S. continued their work in the Mission hospital, two dispensaries, and five welfare centres.

The Supervisor of Health Visitors undertook the training of Health Visitors and the supervision of the various Health Centres in the Province.

Intensified measures against mosquitoes had to be taken owing to the great Nile flood.

Extra staff were employed to destroy mosquitoes in all phases of their development. Flitting of houses on a large scale was carried out. To reduce the number of mosquitoes entering Khartoum from outside, a ring of buildings on the outer boundaries of the city were treated with D.D.T. residual spray.

The usual measures to prevent the ingress of mosquitoes by rail, river, and air transport were taken.

180 Anophlene and 444 Culicine infections were detected in Khartoum. The aedes index was nil.

9,251 rats were caught during the year.

In Khartoum, prosecutions under Health Legislation numbered 208 ; of these 38 were for insanitary premises, 8 for mosquito breeding, 21 for defective and insanitary latrines.

In Omdurman 364 prosecutions were made : 19 for insanitary premises. 5 for mosquito breeding, and 25 for fly breeding.

In Khartoum North 269 prosecutions were made.

(f) KORDOFAN PROVINCE.

Area	146,930 sq.m.	Population ..	1,494,74
Beds	1,043	Per 10,000 population ...	7
Inpatient Admissions ..	19,653	,, ,, ,, ..	132
Outpatient Attendances ..	1,637,810	,, ,, ,, ..	10,957
Vaccinations	46,287	,, ,, ,, ..	309

TABLE 42.

Medical and Health Staff.

CATEGORY	British	Sudanese	Total
Doctor	2	8	10
Nursing Sister	—	—	—
Medical Assistant	—	39	39
Hospital Attendant	—	—	—
Public Health Inspector	—	—	—
Public Health Officer	—	1	1
Sanitary Overseer	—	9	9
Mosquito man	—	59	59

TABLE 43.

Kordofan Province

Work in Hospitals and Dispensaries

UNIT.	Beds	Inpatient Admissions	Operations	Outpatient Attendances
El Obeid Hospital	296	6,951	655	377,286
,, ,, Dispensary (incl. Qur. and Prison)	144	3,315	—	430,972
Nahud Hospital	96	1,542	277	169,710
Nahud Dispensary	116	1,380	—	241,038
Kadugli Hospital	100	1,248	313	52,156
Kadugli Dispensary	176	2,931	18	240,385
Dilling Hospital	88	1,441	439	95,539
Talodi Hospital	60	845	153	30,724
MISSIONS.				
C.M.S. Dispensary	—	223	—	17,748
S.U.N. Dispensary	—	325	—	15,904
TOTALS ..	1,043	20,201	1,855	1,671,462

The 1946 rains were good, being well-spaced and well maintained ; rain grown dura and dukhn crops were generally good. In the Abu Habl scheme crops were disappointing owing to heavy floods and weed growth.

No major epidemics occurred, it is noteworthy that the number of cases of relapsing fever again showed a fall, from 1,683 in 1945 to 314 in 1946.

Influenza, chicken-pox, and diphtheria showed an increased incidence. Dracontiasis continued to be a cause of grave disability among the people of the Nuba Area.

There were 48 cases of leprosy reported.

The rainfall being the heaviest for the last 20 years, mosquito control was intensified. All fulas in El Obeid and in villages in the vicinity were stocked with gambusia, and in none of these were mosquitoes found breeding.

A certain amount of spraying of buildings with D.D.T. residual spray was carried out late in the year.

During an investigation of the malaria situation in El Obeid in October, all the mosquito specimens collected were A. gambiae. The survey of tree and rock holes in the Nuba Mountains continued.

There was a marked increase in the incidence of malaria, 83,280 cases being reported as contrasted with 32,348 in 1945. These figures do not give a true picture of the seriousness of the epidemic, as the increase in the number of cases occurred almost entirely in the months of September, October and November only. The figures for El Obeid town give a better picture of the situation.

	1943	1944	1945	1946
August	360	35	157	480
September	1,422	39	423	6,248
October	526	168	376	8,775
November	215	91	154	3,399

Among the 3,804 admissions in the whole province there were 56 deaths.

Four deaths occurred from hydrophobia, and 761 persons were treated with anti-rabic vaccine. The brains of 12 dogs were reported as positive for rabies.

There was an increase in the number of cases of pulmonary tuberculosis, 151 cases being reported as compared with 107 in 1945.

A greater number of patients attended for treatment for the venereal diseases ; but it was not possible to establish whether this was due to an increased incidence in these diseases or to a keener disease-consciousness among the people. The Sudan Medical Service continued to be responsible for the health of the S.D.F. units in the Province.

(g) NORTHERN PROVINCE

Area	236,200 sq.m.	Population ..	642,962
Beds	634	Per 10,000 population ..	10
Inpatient admissions ..	10,381	,, ,, ,, ..	161
Outpatient attendances ..	1,194,418	,, ,, ,, ..	18,577
Vaccinations	13,733	,, ,, ,, ..	213

TABLE 44.

Medical and Health Staff.

CATEGORY	British	Sudanese	Total
Doctor	2	8	10
Nursing Sister	2	—	2
Medical Assistant	—	46	46
Hospital Attendant	—	122	122
Public Health Inspector	—	—	—
Public Health Officer	—	2	2
Sanitary Overseer	—	17	17
Mosquito man	—	165	165

TABLE 45.

Northern Province

Work in Hospitals and Dispensaries

UNIT.	Beds	Inpatient Admissions	Operations	Outpatient Attendances
Atbara Hospital (inc. 2)	232	4,332	711	198,766
Atbara Dispensary	—	—	—	329,543
Halfa Hospital	194	3,170	366	103,862
Halfa Dispensary	—	—	—	171,192
Merowe Hospital	71	1,242	246	22,711
Merowe Dispensary	—	—	—	123,472
Dongola Hospital	62	683	144	42,645
Dongola Dispensary	7	—	—	150,707
Shendi Hospital	71	954	108	51,520
Shendi Dispensary	—	—	—	—

The Nile flood did considerable damage, 30,000 private houses were lost and 114,000 persons rendered homeless. 15 dispensaries were destroyed.

Winter crops sown in 1945 produced good average yields, the summer crops on river banks and islands were flooded, but the saluka crops (about 186,000 feddans) were good.

Considerable damage to pump schemes and fruit tree nurseries was done.

Increased anti-malarial measures were taken, extra Public Health Staff were drafted into the Province. All houses in the towns were sprayed with D.D.T. residual spray, and houses in outlying districts flitted. No epidemic of malaria occurred.

One case of small-pox (imported from Egypt) occurred during the year.

Of 43 cases of diphtheria treated, 15 died.

19 cases of relapsing fever (17 imported from Egypt) were diagnosed.

There were 1,781 admissions to hospital for malaria with 25 deaths.

The incidence of schistosomiasis showed a slight increase, but cases of the enteric fever dropped from 53 to 17.

There was some increase in the incidence of trachoma. Cases of pulmonary tuberculosis numbered 127, the same as last year.

26,563 persons passed through Halfa Quarantine (See under Chapter V. 1 (a). Anopheles gambiae was eradicated from the Wadi Halfa District.

(h) UPPER NILE PROVINCE.

Area	92,270 sq.m.	Population	711,539
Beds	403	Per 10,000 population ..	5
Inpatient admissions ..	6,545	,, ,, ,, ..	92
Outpatient attendances ..	297,437	,, ,, ,, ..	4,180
Vaccinations	108,791	,, ,, ,, ..	1,528

TABLE 46

Medical and Health Staff

CATEGORY	British	Sudanese	Total
Doctor	2	2	4
Nursing Sister	—	—	—
Medical Assistant	—	19	19
Hospital Attendant	—	71	71
Public Health Inspector	—	—	—
Public Health Officer	—	1	1
Sanitary Overseer	—	2	2
Mosquitoman	—	35	35

TABLE 47

Work in Hospitals and Dispensaries.

UNIT	Beds	Inpatient Admissions	Operations	Outpatient Attendances
Malakal Hospital	244	3,457	483	61,364
,, Dispensaries	159	3,085	—	173,711
MISSIONS :				
C.M.S.	—	3	—	4,976
American Mission				

There was a shortage of food among the Shilluk towards the end of the dry season.

The rains were heavy and crops were good, especially in the Dunjal area.

During the last few months of the year there was an epizootic of trypanosomiasis among the cattle. On some herds the incidence was as high as 50 per cent. Transmission of the disease was thought to be due to direct, and not cyclical, transmission of the trypanosome by blood sucking muscidae,such as tabanidae, stomoxys and hippoboscidae. It is said by the natives that this high incidence always follows a high Nile.

Relapsing fever remained a major problem. Following a well organised campaign of delousing with D.D.T. powder the number of cases in 1946 was 840 as compared with 7,747 in 1945.

There were 40 cases of alastrim reported in the Bor district.

During the delousing campaign, 108,791 vaccinations were performed.

There were 3,648 cases of malaria. The incidence of schistosomiasis (63 B. haematobium and 19 B. mansoni) showed no increase.

Yaws is still highly endemic amongst the Gaweir Nuer, the Nuer of Ler, the Bul Dinka and the Koma.

The *aedes* prevention work during the year covered 49,251 houses, 7,595 public buildings, 6,440 shops and stores, 4,552 tree holes, 32,462 tins, 679 steamers, 1,279 native boats.

CHAPTER VI.

THE PILGRIMAGE FROM THE SUDAN.

Introduction.

The pilgrimage from Suakin and to a lesser extent from Port Sudan, was a large one, being the second on record.

The proportion of Sudanese was as before small (see Table 48). The majority as usual were West Africans. Their main route is via Chad, Fort Lamy, Abesher and Adri to Geneina in Dar Massalit and thence via Fasher to railhead at El Obeid. Such transit pilgrims are mainly of the races, Bornu, Hausa and Fulani coming from Nigeria and Borgu coming from French Equatorial Africa.

The pilgrimage was clean, there being no quarantine diseases reported. The use of D.D.T. blower applicators as a means of delousing was employed with success. The Arafat ceremony, the culminating congregation of the season and the critical point as far as the sanitarian is concerned, was on the 3rd November. The usual S.M.S. Medical Mission accompanied the pilgrimage and though primarily intended for those from the Sudan, gave treatment to all seeking it.

Composition of the Pilgrimage.

Table 48 shows the composition of the outgoing Pilgrimage over the last five years and Table 52 similarly that of the returning Pilgrimage.

TABLE 48.

Outgoing Pilgrimage from the Sudan : 1946/47

NATIONALITY	1943	1943/44	1944/45	1945/46	1946/47
Sudanese	2,500	1,312	1,434	610	1,409
West Africans and others	5,170	6,505	5,565	5,604	6,995
TOTALS..	7,670	7,818	6,999	6,214	8,404

TABLE 49.

Returning Pilgrimage to the Sudan 1946/47.

NATIONALITY	1942/43	1943/44	1944/45	1945/46	1946/47
Sudanese	2,530	1,289	1,441	624	1,409
West Africans and others	4,943	5,241	5,295	5,730	6,662
TOTALS	7,473	6,530	6,736	6,354	8,269

The first of thirteen outward sailings was on 21.8.1946 and the last on 31.10.1946 and the first of the same number of return sailings was on 16.11.1946 the last being on 26.1.1947.

The returning 8269 pilgrims included 211 non-Sudanese who had not left from the Sudan. They probably had left Africa through Mombasa, Massawa and Zanzibar.

Preventive Medicine.

The 1946-47 Pilgrimage was clear of the five quarantine diseases. All outgoing pilgrims were vaccinated against smallpox, inoculated against cholera and deloused with D.D.T. They were at least three days in quarantine. No pilgrim was allowed to embark unless in possession of a valid yellow fever inoculation certificate or a location certificate certifying that he had not been in the yellows fever endemic area within the last six days. On return they were deloused again and spent a minimum of three days in quarantine. Those not showing signs of recent successful vaccination were again vaccinated.

Vaccinations were highly successful in infants and the average success with the thirteen sailings in all ages and both sexes was 61 per cent. Souvenir Zemzem water was sterilized by heat as has been the procedure in the past. At Suakin there were 79 admissions to hospital with 8 deaths. Table 50 shows the nature of the affections.

TABLE 50.

Admissions and Deaths in Suakin Quarantine 1946-47 *Pilgrimage*

DISEASES	ADMISSIONS			Total	Deaths
	Men	Women	Children		
Chicken Pox	1	1	2	4	—
Measles	—	—	1	1	—
Skin Diseases	4	—	2	6	—
Wounds and Injuries	6	2	—	8	—
A. Dysentery	8	2	—	10	1
Malaria	2	—	—	2	—
G. E. of children	—	—	5	5	2
Pneumonia	12	1	—	13	3
Heart Disease	—	2	—	2	—
Diarrhoea	7	1	—	8	2
Respiratory S.	3	2	—	5	—
G. Urinary S.	1	—	—	1	—
Abortion	—	1	—	1	—
All others	3	6	4	13	—
TOTALS	47	18	14	79	8

THE S.M.S. MEDICAL MISSION.

As in the past four years, a medical mission was sent by the Sudan Medical Service to accompany the pilgrimage. It was staffed by a Sudanese Medical Inspector, a Sudanese Medical Officer and 13 other S.M.S. staff. It arrived at Jeddah on 10.9.1946 and its last representative left there on 12.1.1947.

It functioned as a field hospital in Jeddah and as two dispensaries, one in Mecca and the other in Medina, the first travelling with the pilgrimage from Mecca via Muna to Arafat and back to Mecca. Table 54 shows the work done.

TABLE 51.

1946-47 *Sudan Pilgrimage* : *Work of S.M.S. Medical Mission*

(*Analysis by Units*)

UNIT.	Admissions	Out-Patients
Jeddah Field Hospital	17	5,864
Mecca-Muna/Arafat Dispensary..	—	2,510
Medina Dispensary	—	1,342
TOTAL	17	9,716

TABLE 52.

1946-47 *Sudan Pilgrimage. Work of S.M.S. Medical Mission : Diseases*

DISEASES	Admissions	Out-patients.
T. B. of lung	—	1
T. B. non-pulmonary	—	3
Syphilis	—	19
Gonorrhoea	—	27
Trachoma	—	280
All Eye diseases	—	890
All Ear diseases	—	302
Skin diseases	—	326
Wounds and other injuries	4	1,228
Malignant	—	4
Gynaecdgical cases	—	18
Dysentery Amoebic	1	191
Malaria	4	1,021
Tropical Ulcer	—	61
Influenza	—	881
Circulatory System	—	159
Respiratory System	—	1,745
Almentary System	1	1,993
Genito-Urinary System	1	118
All other diseases	—	426
Pneumonia	6	23
TOTALS	17	9,716

CHAPTER VII.

THE MEDICAL WORK OF MISSIONS.

Four missions carry out medical work. The Church Missionary Society ; the United Mission ; the Sudan Interior Mission and the American Mission.

TABLE 53.

Church Missionary Society: *Medical Work* 1946.

PLACE	UNIT.	Outpat. Attends	Inpat. Adms	Major Oper.	REMARKS.
Omdurman ..	Hospital and Infant welfare centre ..	31,863	1,618	240	Laboratory examinations 4,965. Infant welfare consultations 4,910.
Abu Rof ..	Dispensary and infant welfare centre	20,454	—	—	Infant welfare consultations 2,974.
Abu Kadog ..	Dispensary and infant welfare centre	11,404	—	—	Infant welfare consultations 5,192.
Wad Nubawi	Infant welfare centre	—	—	—	Infant welfare consultations 1,034.
Bet el Mal ..	Infant welfare centre	—	—	—	Infant welfare consultations 1,650.
Lui	Hospital	21,296	249	193	
Zeraf ..	Hospital	4,976	3	—	
Malek ..	Dispensary ..	—	—	—	
Ler	Dispensary ..	—	—	—	
Sallara ..	Dispenary ..	10,638	—	—	
Katcha ..	Dispensary ..	7,110	223	—	
Kauda ..	Dispensary ..	—	—	—	

TABLE 54.

Sudan United Mission : *Medical Work* : 1946.

PLACE	UNIT.	Outpat. Attends	Inpat. Adms	Major Opers.	REMARKS
Heiban ..	Dispensary ..	10,201	150	—	
Abri	Dispensary ..	5,703	175	—	
TOTALS ..	—	15,904	325	—	

TABLE 55

American Mission

PLACE	UNIT.	Outpat. Attends	Inpat Adms	Major Opers.	REMARKS
Doleib Hill ..	Dispensary ..	34,900	—	—	
Nasir ..	Dispensary ..	22,486	—	—	
TOTALS ..		57,386	—	—	

The Sudan Interior Mission have a dispensary at Chali and nuns of the Verona Fathers Mission work in Juba and Wau Hospitals.

CHAPTER VIII.

STACK MEDICAL RESEARCH LABORATORIES.

DR. E. S. HORGAN.

RESEARCH.

The desirability of a complete sand fly survey of the Sudan in relation to the transmission of Leishmaniasis has long been felt and a considerable mass of data has been accumulated over some years. The taxonomy of *Phlebotomus* is, however, a highly specialized subject and although illustrated keys for the identification of the Indian species have been published by Sinton (1932, 1933) no such guide has been available for the Ethiopian species. To remedy this defect, Dr. Kirk and Mr. Lewis have made a detailed study of the copious and scattered literature to date and have constructed keys and diagnostic tables. These have now been published in full (1946) and will doubtless prove of great value to all workers on African sand flies. The references to the publications are given at the end of Mr. Lewis's Report.

Studies of Onchocerciasis have been initiated by Dr. Kirk and Mr. Lewis in Equatoria province in areas of high incidence of blindness.

For the treatment of Kala Azar the value of sodium antimony gluconate referred to in last year's Report has been confirmed and the results have been published, Kirk and Satti. (Ann. Trop. Med. and Parasit. 1946).

In the bacteriological department a series of trials of the stability of different preparations of pencillin under the normal climatic conditions of the Sudan, was carried out. Details of these *ad hoc* researches and other activities will be found under the relevant headings.

General comments on the routine examinations.

The total number of examinations 32,096 is practically identical with the 1945 figures 32,130 but some of the figures show considerable differences. The Kahn Tests have shown a steady increase for several years the figures being as follows 1942 (7,646) 1943 (12,486) 1944 (14,438) 1945 (17,277) 1946 (18,269). The figures do not include any Kahn Tests carried out in the hospital laboratories in Port Sudan, Atbara, and Fasher, but include all those carried out for the British Forces and Sudan Defence Force. The biochemical tests (322) also show a sharp rise, the figures for many years ranging between 200 and 240. The rise is chiefly accounted for by the larger number of patients from all parts of the Sudan who are sent to the Stack Laboratories for blood sugars and glucose tolerance tests, although blood ureas, fractional tests meals and biochemical examinations of cerebro-spinal fluids are also increased.

The medico-legal tests chiefly blood and semen stains, although few in number are almost double those of 1944 when the precipitin test for determination of the origin of blood stains was first introduced. The technique mentioned in the Report for that year has continued to give complete satisfaction.

The general bacteriological examinations have shown a steady upward trend for some years; part of this increase is due to the number of requests for the determination of the susceptibility of freshly isolated organisms to pencillin. The water tests (146) have approximately doubled compared with 1945 (70); this increase is chiefly due to the routine weekly sampling of the Khartoum water supply which was instituted during the year.

Slight decreases have occurred in faeces and urine examinations and in the total number of swabs examined for *C. diphtheriae* but there is no reason to consider the differences as of any significance, as such tests show considerable annual variations

Staff Changes — 3 Sudanese Laboratory Assistants were trained bringing the total to 41. The number of hospital laboratories remains the same (26).

Histology

The total number of specimens examined was 762 including 228 brains for rabies.

Malignant Neoplasms

138 were received.

SITE.	Carcinoma	Sarcoma	Endothelioma	Melanoma	Mixed Tumours	TOTAL
Scalp	5	—	—	—	—	5
Face	4	—	—	—	—	4
Lip	3	—	—	—	—	3
Mouth	3	1	—	—	—	4
Maxilla	1	—	—	—	—	1
Nose	3	—	—	—	—	3
Eye	6	4	—	2	—	12
Neck	1	3	—	—	—	4
Salivary Glands	—	—	—	—	6	6
Shoulder	—	2	—	—	—	2
Chest	—	1	—	—	—	1
Finger	1	1	—	—	—	2
Arm	—	2	—	—	—	2
Leg	5	1	2	—	—	8
Foot	1	4	—	10	—	15
Stomach	—	1	—	—	—	1
Pancreas	1	—	—	—	—	1
Small Intestine	—	1	—	—	—	1
Large Intestine	2	—	—	—	—	2
Rectum and Anal Canal	6	—	—	—	—	6
Abdomen	2	1	1	—	—	4
Liver	3	—	—	—	—	3
Spleen	—	2	—	—	—	2
Bladder	2	—	—	—	—	2
Groin	—	2	—	—	—	2
Testis	—	1	—	—	—	1
Ovary	3	1	—	—	—	4
Uterus	3	—	—	—	—	3
Vagina	2	—	—	—	—	2
Breast	18	—	—	—	—	18
Lymphatic Glands (Secondaries)	6	6	—	—	—	12
Skin (Site unspecified)	1	—	1	—	—	2
TOTAL	82	34	4	12	6	138

RABIES.

228 brains were received of which 60 were positive for Negri bodies. They included 48 dogs, 1 horse, 6 donkeys, 1 bull, 3 cows and 1 goat.

The total number of brains sent for examination is the highest yet recorded while the number positive for rabies is the highest since 1943 the figures for that year being 200 and 77 respectively.

Rabies Vaccine

108,600 c. cms. were issued. This amount is a record, the previous three years figures being 88,925 c. cms. (1945) 97,150 c. cms. (1944) 106,400 c. cms. (1943).

Three figures appear to suggest a considerable increase in the incidence of rabies in the Sudan but owing to the incomplete and cursory rabies statistics supplied, it is impossible to assess their real significance.

VISCERAL TORULOSIS (BLASTOMYCOSIS)

The patient was a boy of 17 years who came to Khartoum Hospital complaining of generalized enlargement of the lymphatic glands but specially marked in the inguinal and femoral regions. The spleen was just palpable while the liver was two inches below the costal margin. There was no fever and his general condition was good.

Hodgkin's disease was suspected and a gland was excised from the groin and sent for examination.

Sections showed a granulomatous condition with many large histiocytes and giant cells containing the organisms in considerable numbers. Cultures were also obtained on Sabouraud's medium. The section was reported as histoplasmosis but Dr. Duncan—London School of Hygiene and Tropical Medicine to whom slides were submitted, considered that the condition was not histoplasmosos but torulosis. The cultures unfortunately became contaminated and could not be recovered. In their absence Dr. Duncan provisionally suggested that the infection probably was a "torula " of the type *Cryptococcus neoformans.*

The association of cryptococci with various adenopathies is of course well known but although dermal blastomycocis is not uncommon in the Sudan in the writer's experience, the present condition has not been previously reported.

BACILLARY DYSENTERY

The number of isolations show a considerable drop from those of 1945 the chief reduction being in the Shiga infections, 39 compared to 78. As usual, the Flexner V-Z series was the predominant type, 110 out of 172.

From a typical blood and mucus faeces a new strain was isolated. It was dulcite and mannite-negative, rhamnose positive and indole-positive and was not agglutinated by any of the available anti-sera. It appears to be identical with a new type (Q 902) recently reported from the Middle East by Maclennan (J. Path and Bact. 1945 — 57. 307).

SALMONELLA INFECTIONS

The number of isolations of *Bact . typhosum* from faeces has sharply risen; 120 as compared to 66 for 1. 45. As the numbers of clinical cases reported and blood cultures isolated remain much the same as in previous years, the increase in positive faeces is very probably due to the more selective selenite enrichment method (See Report 1945).

ONCHOCERCIASIS

(i) Entomological

A survey was made by Mr. Lewis in Equatoria in February and March in connection with the problem of onchocerciasis. The following 14 species of Simulium are now known to occur in the Province.

S. alcocki var. *henrardi* Gibbins.
S. adersi Pomeroy.
S. bovis De Meillon.
S. brachium Gibbins.
S. cervicornutum Pomeroy.
S. damnosum Theobald.
S. dentulosum Roubaud.
S. elgonensis Gibbins.
S. griseicollis Becker
S. impukane De Meillon.
S. lepidum De Meillon.
S. ruficorne MacQuart.
S. unicornutum Pomeroy.
S. sp. (undescribed).

S. damnosum. S. adersi, S. bovis, and *S. griseicollis,* are able to bite man but *S. damnosum* is the only species at present known to do so in Equatoria and is assumed to be the vector of onchocerciasis there.

It is widely distributed in the Sudan, occurring near both the Uganda and Egyptian borders. It is found in the middle reaches of most of the rivers of western Equatoria, and along the Blue and main Niles. It is present in many areas where human onchocerciasis is at present unknown but in the Northern Sudan is abundant in comparatively few places.

Control of *S. damnosum* in the onchocerciasis areas of western Equatoria is a difficult problem. In several countries DDT emulsion has recently been found effective in streams against simuliids but is unlikely to be suitable here owing to the danger to fish and predatory insects and the great range of flight (up to 45 miles) of *S. damnosum,* and because the rivers concerned are large during the breeding season and difficult of access in many places. It is a common experience in Equatoria to experience attacks by *S. damnosum* far from breeding places and, conversely, to find thousands of larvae and see no adults.

(ii) Helminthological.

During the month of December, Dr. Kirk visited the Wau area and carried out a preliminary study of the incidence of onchocerciasis.

A simple technique of using dried and and stained skin smears from the arm was found more satisfactory than the method usually recommended for the demonstration of *Mf. volvolus* in the skin. In the areas of onchocerciasis a high incidence of infection was found by this method among apparently healthy people with no signs or symptoms of the disease ; approximately 80 per cent in some places. The technique is especially suitable for taking random surveys of populations, and was used to map out the incidence of onchocerciasis in some districts. It was found that the areas of high incidence were localised, near the banks of rivers. The infection rate declines quite rapidly with distance from such a centre of high incidence, much more rapidly than one would expect from the accounts of this disease given in the text books, which usually emphasize the wide range of flight of the vector *Simulium damnosum.*

As has been established elsewhere a correlation has been established between the incidence of onchocerciasis nodules, positive skin smears, and ocular lesions. Several cases of blindness were seen in which no visible changes could be detected in the eyes either externally or with the ophthalmoscope.

It is hoped that in the future, quantitative surveys of this type will prove of more value than the anecdotal evidence of the past when questions of control or displacement of populations are being decided.

BILHARZIASIS.

Cases of antimony poisoning with sodium antimony tartrate following treatment by the intensive method of Alves and Blair. (1946—*Lancet I*. 9).

In view of the excellent results reported by the authors from Rhodesia, arrangements were made by the Director, Sudan Medical Service to have limited trials carried out in bilharzial areas under experienced medical supervision. The results of the trials which appears to have been therapeutically disappointing will be reported elsewhere. The present section is concerned with the pathological appearances of the kidneys and liver in five cases dying during or immediately after the course of treatment.

Liver—There was extensive and diffuse necrosis, the changes varying from granular degeneration of some lobules to an advanced degree of hyaline necrosis. There were many " Councilman bodies " in the latter areas and these structures together with a certain degree of scattered fatty changes in some of the comparatively normal cells gave a histological picture curiously like that of yellow fever. This picture was necessarily complicated by the characteristic changes of chronic bilharzial infiltration and cirrosis.

Kidneys—The glomeruli appeared slightly congested but otherwise normal. The tubules showed marked cloudy swelling progressing in many areas to an advanced hyaline necrosis.

The above histological picture, especially in the liver is quite unlike anything previously reported in the literature of bilharzia as far as the writer is aware and there seems no alternative but to ascribe the changes to the direct toxic action of the antimony. These fatal cases, together with others who exhibited marked toxic symptoms during the course of treatment are in marked contrast to the absence of toxic symptoms and the very successful results of the Rhodesian workers but no explanation of the discrepancy can be offered at present.

PENICILLIN.

(i) Determination of sensitivity of bacteria.

A simple and rapid method of determining the sensitivity of freshly isolated organisms by means of impregnated blotting paper discs has been recently described by Morley, (J. of Path and Bact. 1945 Vol 57. 379). By this technique it is often possible to determine sensitivity of the infecting organisms in 24 hours from exudates or pus, especially in those cases where the material is not heavily contaminated with mixed bacterial flora. A series of trials of this method has been carried out and as the conclusions of the author have been fully confirmed it has been adopted as the standard method in the Stack Laboratories.

(ii) Sensitivity of C. diphtheriae.

In view of the difficulty experienced in reading some of the results with the standard agar cup method(Report 1945) a further series of 50 freshly isolated strains 50 *Mitis*, 1 *Gravis*—was tested by the disc method.

All strains were found to be sensitive to one unit of penicillin, the zone of inhibition being clearly defined. The discrepancy between these results and those reported in 1945 when it was found that 13 % were insusceptible cannot be explained at present.

(iii) Stability of penicillin.

Although the stability of this drug has now been thoroughly studied under standard conditions, no experimental work seems to have been carried out on the stability of the various standard (B.P.) preparations under the climatic conditions existing in tropical countries. The matter is of considerable importance in the Sudan, for although the drug is despatched to the various provincial hospitals under refrigeration as far as possible, the latter is not always practicable. Trials were accordingly instituted to determine the stability of various preparations at the average room temperature of Khartoum—about 90°F — which may be taken as representative of many places in the northern Sudan for most of the year.

The following B.P. products were tested—the method employed in all experiments being the standard agar cup method (Report 1945).

1. Penicillin—sodium salt as used for injection—510 units per mgm.
2. Penicillin lozenges—500 units per tablet.
3. Penicillin ophthalmic calcium salt—250 units per tablet.
4. Penicillin cream—cream base supplied separately (B.W. and Co.).

The sodium salt was added to a concentration of 500 units per grm.

The results can be briefly summarized as follows :—

(1) and (2) sodium salt and lozenges—no appreciable loss in potency noted over a period of ten weeks.

(3) ophthalmic tablets—no appreciable loss in potency over a period of five weeks. Trials were then discontinued.

(4) cream—a loss in potency of approximately 27 per cent over a period of three weeks. A comparable trial at refrigerator temperature 40° to 44°F showed a loss of 14 per cent over the same period.

Comments—These results are quite clear cut and indicate a much higher stability than was expected for all preparations except the cream. The loss in potency of the latter even at refrigerator temperature indicates the importance of fresh preparations at frequent intervals.

VACCINIA.

(i) Research—Local skin immunity.

The occurrence of accidental vaccinial infections on the hands of workers engaged in the manufacture of vaccine lymph is well known but the puzzling feature of these cases is that as judged by ordinary vaccination the majority are strongly or completely immune. A series of observations on nine such cases in these laboratories has been previously published by Horgan and Haseeb (J. of Hyg. 1944 Vol. 43-273) but no explanation of the apparent discrepancy could be suggested. It has however been recently suggested by Marsden that some type of local immunity may explain the discrepancy in the results and cases have been reported where repeated re-vaccination in one area produced only immuno reactions but true vesiculation was produced by vaccination of a different site in the same person. Much more experimental work is needed on this problem and it would be of some importance to know whether the common practice of re-vaccination on the same area showing scars of the primary vaccination may not lead to fallacious results. In other words, does an immune reaction in this area necessarily imply a corresponding immunity in other skin areas and a general immunity of the individual.

In an attempt to elucidate the matter, the following experiment was performed. Re-vaccination was carried out on 148 volunteers all of whom showed well marked scars from previous vaccinations. Two linar insertions were made in two scars and two insertions in the corresponding areas of the other (non-vaccinated) arm.

The results showed 20 vaccinoid and 276 immune reactions on the scars compared with totals of 21 and 275 respectively on the " control " areas. These almost identical results do not support the hypothesis of local immunity but it would be unwise to draw any general conclusion from this experiment. For one thing, the results are overweighted by the number of persons presumably completely immune as indicated by the number of immune reactions on both areas. It is hoped to carry out a further experiment on persons possessing lesser degrees of immunity (i.e. those reacting with a larger number of primary or vaccinoid reactions) and in whom there might be a better chance for demonstrating any differences in local immunity.

(ii) Routine vaccine lymph

90 sheep were used with a total yield of 4446 grms of pulp, the average being 49.4 grms per sheep.

These figures compare with a total of 21 sheep with an average per animal of 52.6 grms. in 1945.

Doses issued

746,280. This figure includes 100,000 doses which were sent to Dar es Salaam in response to an urgent request from the Director of Medical Services, Tanganyika.

Summary of Routine Examinations

Khan Tests	18,269
Widal Reactions	1,203
Weil-Felix Reactions	15
Heterophile Agglutinations (Paul-Bunnell)	3
Blood Cultures	705
Blood Films	2,614
Blood Counts (Total)	130
Cerebrospinal Fluids	74
Medico-Legal Tests (Blood Stains)	25
Biochemical Tests	322
Autogenous Vaccines	5
Pathological Histology (Including brains for rabies)	762
Faeces	2,063
Urines	1,251
Throat and Nasal Swabs : *C. diphtheriae* Positive	340
,, ,, ,, ,, ,, Negative	3,288
Sputa *Myco. Tuberculosis* Positive	27
,, ,, ,, Negative	135
Spleen Smears (Kala Azar positive)	4
General Bacteriological Examinations	715
Water Examinations	146
Total Examinations	32,096

Summary of Faeces Examinations.

Bact. dysenteriae Flexner V.Z. series	110
Bact. dysenteriae Sonne	2
Bact. shigae	39
Bact. ambiguum (Schmitz)	21
Bact. typhosum	120
Bact. paratyphosum A.	3
Entamoeba histolytica	24
Ova present	31
Negative	1,713

Summary of Urine Examinations.

Bact. typhosum	43
Bact. paratyphosum A.	3
Ova present	18
Negative	1,187

Summary of Blood Films.

Malaria :—

,,	Benign Tertian	14
,,	Subtertian	781
	Relapsing Fever	6
	Negative	1,813

Summary of Widal Reactions.

Bact. typhosum	98
Bact. paratyphosum A.	4
Bact. paratyphosum B.	1
Br. melitensis	71
Negative	1,029

Summary of Blood Cultures.

Bact. typhosum isolated	43
Br. melitensis isolated	1
Strep. pyogenes isolated	23
Other organisms isolated	30
Negative	608

Summary of Weil-Felix Reactions.

Negative	15

Summary of Hetrophile Agglutination Tests.

Postive	1
Negative	2

Vaccines Issued During 1946.

T.A.B.	9,975 cc.
Anti-rabic	108,600 cc.
Staphylococcal	250 cc.
Cholera	9,400 cc.
Vaccine Lymph	746,280 units

CHAPTER IX

REPORT ON MEDICAL ENTOMOLOGY FOR 1946.

MR. D. S. LEWIS.

GENERAL.

The Medical Entomologist visited many parts of Equatoria Province and went to Wadi Halfa, the Jebel Auliya Reservoir and Atbara.

Enquiries were received from various parts of the country and 144 collections for determination.

Tests of several insecticides were made, special precautions against contamination of experimental insects with DDT from neighbouring control areas being necessary.

A pentastomid, *Armillifer armillatus,* from a human lung, was received from Juba Hospital.

The best available microscope mounting medium for small insects under local conditions appears to be Puri's fluid with cover glasses ringed with the same fluid and no other.

SANDFLIES.

Work on distribution was continued. One of the manbiting species *Phlebotomus clydei,* was found to extend as far north as Atbara and also south of the Bahr el Ghazal swamps.

ANOPHELINE MOSQUITOES.

The Gezira.

The Section collaborated with the Public Health Department in a field trial of DDT-in-oil larvicide over an area of some 80,000 feddans round Wad Medani. The efficacy of this larvicide is now well-known and attention was mainly devoted to organization, especially the use of a map system showing where each man works on each day, to facilitate rapid inspection. The trial is still in progress.

Numbers of anophelines collected in some Gezira villages in October and November are of interest.

	Males	Females	Total
A. gambiae	354	2,677	3,031
A. rufipes	272	351	623
A. pharoensis	0	1	1

The large proportion of *A. rufipes* was attributed to an increase in water plants in canals. The high proportion of males in this species is noteworthy. The small number of *A. pharoensis* illustrate the " non-domestic " habits of this species which is common in the area.

The Jebel Aulia Reservoir.

Experiments with *Gambusia* have shown that this fish only controls a limited number of mosquito larvae in the swamps, and that the indigenous *Aplocheilichthys loati* has spread further north. For partial biological control is it at present advisable to rely on *A. loati.*

The floating fodder grass, *Vossia cuspidata,* is still increasing at Dueim. It breeds a certain number of mosquitoes, but any interference with it by weeding or razing greatly increases the number, particularly of *A. rufipis* which is probably malaria vector of some importance.

The Wadi Halfa Eradication Scheme.

Several visits were made to the area of the *A. gambiae* eradication scheme. Control work was stopped in April north of Gemai as a test of eradication but was not continued for a year as great numbers of culicines bred in the autumn floods and oiling became necessary. No *A. gambiae* were found in the Wadi Halfa area during the year although numerous pools appeared as usual, and it is considered that *A. gambiae* has been exterminated. It is desirable however to leave the area uncontrolled (except at Faras) for a complete year (till 16th. November, 1947) to obtain additional evidence. A small staff will always be necessary to watch for possible re-infestation.

The great Nile flood inundated some 14,000 feddans in the area. Apart from the striking evidence of eradication afforded, it was fortunate, for the thousands of homeless people that the flood year had been chosen as the year for *gambiae* extermination and that as a result it became impossible to acquire malaria from mosquito bites.

Eradication was achieved by little more than the normal public health staff attacking the mosquito when it was scarce in the cold weather.

A. dthali was received from Faras for the first time and is thought to have spread from Egypt.

Equatoria.

Anophelines not previously known in the Sudan were found, *A. mouchcti* near Wau by Dr. P. H. Abbott and *A. garnhami* and *A. demeilloni* at Katire.

Kassala Province.

Gambusia fish were sent to the new artificial lake at Erkowit.

CULICINE MOSQUITOES.

Monthly summaries of returns of *Aedes aegypti* Control were prepared as usual.

Several culicine species new to the Sudan were found during the year.

SIMULIIDAE.

During a visit to the onchocerciasis areas of Equatoria 14 species of Simuliidae were found. Recommendations on control of *S. damnosum* were made but this is difficult at present owing to the close association between the people and the rivers in many affected areas.

TABANIDAE.

Tabanids attacking animals and received from the Fung were mainly *Tabanus fuscipes.*

NON-BITING MUSCOID FLIES.

Musca cuthbertsoni was found to be common at Wad Medani.

BITING MUSCOID FLIES.

Stomoxys calcitrans was found breeding in horse manure at Wad Medani.

Control areas of *Glossina palpalis* were visited and new measures appeared unnecessary.

PUBLICATIONS.

The following papers have been published since those noted in the last report.

Kirk, R. and *Lewis, D. J.* (1946). Taxonomy of the Ethiopian sandflies (*Phlebotomus*). I.—Classification and synonymy.—Ann. Trop. Med. and Parasit., 40, 34-51.

Lewis, D. J. (1946). The egg of *Anopheles squamosus* Theobald.—E. Afr. Med. J.

.... and Kirk, R. (1946). Five new species of *Phlebotomus* (Diptera, Psychodidae) from the Sudan.—Proc. Roy. Ent. Soc. Lond. (B), 15, 55-60.

..............(1946). The male of *Phlebotomus serratus* Parrot and Malbrant (Psychodidae, Diptera). *Ibid.*, 61-62.

The following not emanating from this Section, deal partly with medical entomology in the Sudan.

Dethier, V. G. (1945). The transport of insects in aircraft.—J. Ec. Ent., 38, 528-531.

Somers, R. B. U. (1945). A case of tick typhus in the Sudan.—Brit. Med. J., p. 848.

Stephenson, R. W. (1945). Mite-borne typhus in the Anglo-Egyptian Sudan.—Lancet, pp. 341-342.

Worthington, E. B. (1946). Middle East Science........., London.

CHAPTER X

THE WELCOME CHEMICAL LABORATORIES

DR. A.J. HENRY

1. Introduction.

During the year under review the demands of routine work have again been heavy, and have left little time available for the research work which should form an important part of the function of these laboratories. In consequence only a limited amount of work of an investigational nature has been possible.

It has been hoped that 1946 would have seen the re-establishment of these laboratories in new accommodation in Khartoum, but other building programmes of higher priority have intervened and there now appears little hope of this being realised before the end of 1947. This is a great disappointment to all members of the staff.

The number of samples examined during the year was 867 as compared with 766 in 1945 and 923 in 1944. A substantial decrease, as compared with 1945, in the number of foodstuffs examined was more than offset by a large increase in the number of toxicological samples received as a result of the discovery in wide circulation throughout the country of cooking utensils which had been coated with lead instead of tin. Again the Sudan Medical Service accounts for half of the total samples submitted, and for substantially more than half of the total available working time.

2. Summary of examination made:-

The samples received during the year were classified as follows, the corresponding figures for 1945 being also given:-

	1946	1945
Waters	59	79
Foodstuffs	177	280
Medico-Legal and Miscellaneous Drugs	304	128
Mineralogical	85	74
Miscellaneous	242	205
Total	867	766

During the year three original papers and the Report of the Government Analyst for 1945 were published.

Waters. The regular examination of the principal water supplies of the country and of the Railway well waters, has still not been re-introduced since the war. A few samples were received from Port Sudan and Tokar supplies, but the majority were from isolated wells in various parts of the country. All samples but one were classified as potable waters.

Foodstuffs. Under this heading are classified milks, submitted by the Public Health Authorities, alcoholic beverages and miscellaneous foodstuffs which include grains and flours, butter and other edible oils and fats, cordials, sugar and honey, essences, milk foods and various other samples.

Medico-legal and Miscellaneous Drugs. These are sub-divided into pathological (42), toxicological (222) and miscellaneous drugs. Of the first group twenty two samples were associated with twelve separate cases of suspected poisoning, positive findings being mercury, zinc, and alkaloid of the atropine group and a sulphonamide compound. In addition thirteen articles of clothing associated with a case of suspected rape were examined for the presence of semen; five stools for split and unsplit fat; one urine for the presence of quinine and mepacrine; and one urine for free and acetylated sulphaguanidine.

Of the samples classified as toxicological one hundred and eighty six were household utensils submitted for examination for the presence of readily soluble lead. Of these no fewer than one hundred and six gave positive—and in many cases extremely strong—reaction for the presence of lead. Many of the utensils which gave positive tests for lead had been imported from Egypt, but many had been recoated in the Sudan with either lead or an alloy rich in leads. It is very fortunate that the Public Health Authorities took up this matter at an early stage and with vigour, as otherwise serious outbreaks of chronic lead poisoning must have occurred.

Amongst other toxicological specimens were: a mercuric chloride-sodium chloride sterlizing tablet; a fruit of the family Cucurbitaceae, containing cucumin or an allied toxic principle, use of an extract of which as an enema had resulted in death: a fluid which contained an atropaceous alkaloid ; locust baits and grain for arsenic; a liquid, alleged to have been prescribed for ear drops, which was syrupy phosphoric acid instead of glycerine. In addition, two samples of hashish and one of opium were identified, and a medicinal preparation contained the prohibited drugs ephedrine and ethylmorphine.

The miscellaneous drugs included DDT and DDT "residue", dulcin (p-phemotol carbamide), boric acid, sodium silicofluoride and a number of drugs submitted for conformity or otherwise to B.P. requirements.

Mineralogical. Included in this category are coals examined for the Railways, minerals oils and various minerals and related materials.

Miscellaneous. Sixty seven of these were oil seeds and cake examined for oil content, and grains for dirt content; 106 methylated spirits examined for the Customs; 36 were cases of spoilage; and others which covered a wide variety of materials.

Investigations. The limited amount of time which has been available for research has been spent in concluding the investigation of the changes which stilbamidine undergoes on irradiation (this work has now been published in the Journal of the Chemical Society); in following up the excretion of the saturated product of the irradiation of stilbamidine after injection into sheep; and in an investigation of the seed oils of *Chrozophora plicata* and *Dobera roxburghii.*

Earlier views regarding the nature of the photochemical changes which stilbamidine undergoes have been confirmed; and the saturated irradiation product which is almost certainly a cyclobutane derivative, has been found to be excreted in the urine only to a small extent after intravenous injection into sheep, thus closely resembling stilbmaidine itself in this respect.

CHAPTER XI

KITCHENER SCHOOL OF MEDICINE.

DR. R.M. BUCHANAN

GENERAL.

The recognition of the School by the Committee of Management of the Royal Colleges was continued for another two years from 1st. January 1946, on the recommendation of Surgeon Rear-Admiral C.P.O. Wakeley, C.B., F.R.C.S., D.SC., who acted as Visitor during the period of the Examinations in January 1946. He further recommended that graduates of the School should continue to be admissible to the Final L.R.C.P., M.R.C.S. examination, and to the several post-graduate diplomas granted jointly by the Royal College.

This privilege was first accorded to graduates of the School in 1945, on the recommendation of the then visitor, Mr. Max Page, C.B., D.S.O., M.S., F.R.C.S., after review of the progress of the School. It marked the end of the 21st Academic Year.

Dr. Eardly Holland, M.D., F.R.C.P., F.R.C.S., President, R.C.O.G. attended the examinations in Obstetrics and Gynaecology as assessor. His report to the R.C.O.G. recommends that the Khartoum and Omdurman Civil Hospitals be recognised as suitable for training for the D. Obst. R.C.O.G. examination.

The following graduates are at present studying in London:-

Dr. Hussein Ahmed Hussein, D.K.S.M. (1931) Post-Graduate Course, D.O.M.S.

Dr. Mansour Ali Haseeb, D.K.S.M. (1934) Post-Graduate Course, Dip. Bac.

During 1945-46 the course has, as formerly, comprised a premedical period of eighteen months at the School of Science in the study of Biology, Chemistry and Physica, two preclinical years spent in the Medical School on the study of Anatomy, Physiology, Pharmacology and Parasitology, and finally two and a half years in clinical subjects and hospital practice. After graduation, there is a probationary period of two years, when the graduates hold in rotation resident appointments in the teaching hospitals (Khartoum and Omdurman) covering all aspects of medical and surgical routine. On completion of this period they then leave the supervision of the School to take up posts in the Provinces.

Number of Medical Students:

School of Science February—December 11 (9 males 2 females)

School of Medicine January—December Preclinical 5

January—December Clinical .. 7

PROGRESS OF CLASSES.

There are no entry into the School of Medicine in 1946.

Eleven selected students entered the School of Science for the Premedical Course in 1946. Two have since discontinued their studies. The remainder have passed into their second year, and will enter the Medical School in September 1947 if successful in their examinations in Biology, Chemistry and Physics.

This is the last entry into the School of Science to take an eighteen month premedical course. The subsequent entry in January 1948 will take a course of one year of premedical study.

The Students Clinical Society met monthly.

All clinical students were welcomed at the monthly meetings of the Sudan Branch of the British Medical Association. There was a high level of attendance.

THE ARCHIBALD PRIZE.

The competition for the Archibald Prize in Social Medicine was held for the first time in October 1946. This prize—to the value of £E. 5—has kindly been gifted by Sir Robert Archibald, C.M.G., D.S.O., M.D., and will in future be awarded biennially. The subject for 1946 was " Factors in the Sudan which influence Epidemics ". Dr. N.L. Corkill (Lecturer in Social Medicine) adjudicated. Four essays were submitted. The prize was awarded to Hamadnallah El Amin, the runner up being Taha Baasher. The Adjudicator expressed himself as well satisfied with the general standard of the entries.

PROFESSIONAL EXAMINATIONS.

Owing to the late arrival of the visitor (Mr. L.E.C. Norbury, O.B.E., F.R.C.S.) the Professional Examinations for the year 1946 were held in January 1947. The following were held:-

Public Health: Examiner, Dr. H. Richards, M.B., B.S., D.T.M. & H.

Pathology: Examiner, Dr. W.F. Townsend-Coles, M.B., B.S.

Anatomy : Examiner, Mr. F. Bartholomew, F.R.C.S.E.

Physiology: Examiner, Dr. J.S. Aldridge, M.R.C.S., L.R.C.P.

All candidates were successful. The following prizes were awarded:-

Balfour Prize in Public Health	:	Abdel Gadir Hassan.
Jackson Prize in Pathology	:	Abdel Gadir Hassan.
Prize in Anatomy	:	Lewis Abdo.
Prize in Physiology	:	Lewis Abdo

By special recommendation of the Board of Examiners, the Visitor concurring, Abdel Bari Mutwakil was awarded a Pass with Distinction in Anatomy and Physiology.

THE VISITOR.

The Visitor from the Royal College of Physicians and Surgeons was Mr. L.E.C. Norbury, O.B.E., F.R.C.S., a Member of the Council and of the Committee of management. Mr. Norbury scrutinized the papers in all subjects and attended the oral and practical examinations in Pathology. He was present at the final assessment of the candidates. The visitor inspected the School and the teaching facilities and visited the teaching hospitals both in Khartoum and in Omdurman and the Graphic and Pathology Museums associated with the School. He also visited the Gordon Memorial University College and discussed with the Principal (Dr. Tothill) the alteration in the Pre-Medical Curriculum, and the liaison between College and School. The Visitor's report will be presented to the Committee of Management of the Royal Colleges.

POST-GRADUATE COURSE.

No post-graduate course was held in 1946.

TEACHING STAFF.

Dr. J.S. Aldridge, Dean of the Medical School from 1938 till 1946 resigned on appointment as Assistant Director (Hospitals) Sudan Medical Service and was succeeded by Dr. R.M. Buchanan. The School Council at their 89th Meeting expressed their appreciation of Dr. Aldridge's unstinting work during a long and successful period of office.

The following lecturers resigned on completion of their tour in the Sudan:-

Dr. N.L. Corkill (October 1946) Lecturer in Social Medicine.

Dr. Alice Muir Leach (July 1946) Lecturer in Diseases of Children.

Dr. Corkill has been appointed Lecturer in Tropical Hygiene at the Liverpool School of Tropical Medicine.

These lectures were completed in the first term of the year.

Dr. M.D. Messent, M.R.C.S., L.R.C.P., was appointed Lecturer in Anaesthetics in place of Dr. R.M. Buchanan, on the latter's appointment as Dean on 1st September 1946 in succession to Dr. Aldridge.

ADMINISTRATION.

Mr. R.V. Low retired from the General Board.

Dr. A.R. McKelvie resigned from the School Council and Dr. J.S. Aldridge was appointed in his place.

LIBRARY.

36 new books were added to the library. 472 volumes were lent out to civil and service practitioners, and students. The library now contains 1,636 volumes. The Lancet, British Medical Journal, and Practitioner are available as are the Proceedings of the Royal Society of Medicine and the Tropical Diseases Bulletin, and the British Medical Bulletin, the Journal of Surgery, Obstetrics and Gynaecology and other periodicals.

PATHOLOGICAL MUSEUM.

The museum now contains 375 specimens. A number (16) of the older specimens have been replaced by fresh material giving better contrast and display. Wentworth's method of mounting has been in use since 1942 and found to be very successful.

GRAPHIC MUSEUM.

This continues to be of great use and is a general attraction. It is open to the Public. 3799 recorded visits were noted for the year (3069 in 1945). Models, posters and exhibits are sent to health centres and agricultural shows. Dr. N.L. Corkill was Curator till his resignation is October 1946.

STUDENTS HOSTEL.

A lawn was laid down in the latter part of the year. Alterations o the drainage scheme and kitchen are temporarily held over pending decision on the building of a new hostel.

HEALTH.

The health of the students remains good.

GAMES.

Facilities for tennis, football and netball are provided in the School grounds. The tennis court was relayed this year.

CHAPTER XII

THE S.M.S. SCHOOL OF HYGIENE

This school is accommodated in a room in the Khartoum Public Health Departments buildings and a room in the S.M.S. Graphic Museum and has the use of a laboratory by the courtesy of the Kitchener School of Medicine. The S.M.S. Graphic Museum provides certain training matter and practical work is carried out in Khartoum City and the Province Rural District. There is a hostel for 6 students adjoining the Khartoum Public Health Department.

The Staff of the school consists of the Principal, who is a British Public Health Inspector, and the assistant to the Principal who is a Sudanese Public Health Inspector. Four Boards of Studies in association with the School control the syllabus and curriculum, the selection of candidates, the appointment of teachers and examiners and the examinations, in each of the four categories of staff, Public Health Officers (for certificates of the Royal Sanitary Institute), Sanitary Overseers, House-to-house Inspectors and Mosquito-men though this last group will continue for the most part to be trained in their own areas; these Boards report to the Director Sudan Medical Service and in each case, the Chairman is the Assistant Director, Public Health and the Secretary, the Principal of the School.

The basis of education on which training is super-imposed is that of the 4th Year Intermediate School standard, meaning a work-a-day knowledge of English and the desirable transition is from House-to-house Inspector to Sanitary Overseer, the better educated, cleverer, more ambitious and successful Sanitary Overseers may progress to selection for the course for Public Health Officers for which category also, the door is open to candidates of higher basic education, without previous practical experience in hygiene. It is expected that the standard of education of mosquito-men will rise so that they may also have the prospect of competing for the higher categories, for the mosquito-man with the advent of modern insecticides and methods is now required to be something of a skilled technician and no longer merely an intelligent labourer.

Mosquito-men.

These men are trained by Sanitary Overseers and Public Health Officers in the localities in which they are employed. All such staff are Sudan Medical Service personnel.

House-to-house Inspectors.

These are employees of local government authorities and training is carried out locally by the senior public health official (at present central government staff) in the area. The subjects taught are on a curriculum prepared by the Principal of the School of Hygiene and cover: personal hygiene, inspection procedure, housing, food preparation and manufacture, disposal of waste matter, entomology and its applications, prevention of disease, and sanitary law.

Sanitary Overseers.

These are Sudan Medical Service officials and candidates may be drawn from Mosquito-men, House-to-house Inspectors or others. The training course lasts one year. The curriculum is that of House-to-house Inspectors in more detail and extended to include also:- control of foodstuffs, water-supplies, hygiene of schools, communicable diseases, methods of disinfection, village sanitation, office routine and storekeeping.

Public Health Officers.

Students are drawn from selected Sanitary Overseers and others by record of service, examination and interview. The course is of three years and the qualifying examination is that of the Royal Sanitary Institute.

The curriculum is as follows:- 1st year: General science, arithmetic, geometry and English at the Omdurman Technical School : 2nd. Year: entomology and pest control, helminthology, protozoology bacteriology, water-supplies, disposal of waste matter; and 3rd. year foodstuffs, nutrition, meat inspection, milk, food preparation and manufacture, housing, urban and rural planning, communicable diseases, control of disease, school health, prison health, industrial health, quarantine, air port and sea port control, vital statistics, and sanitary law.

PROGRESS DURING 1946

During the year 9 students were under training. At the final examination for the certificate of Sanitary Officer of the Royal Institute, two candidates passed.

During the year 20 House-to-house Inspectors were trained. Classes averaging 18 from the Medical Assistants Training Course in Omdurman received instruction four days weekly throughout the year and policemen from the Police Training School Omdurman were given a three weeks course of lectures and demonstrations.

CHAPTER XIII.

THE OMDURMAN MIDWIVES SCHOOL

The School has trained 477 midwives since 1921 and 356 are actually in practice in 1946. Of these 356, 322 were practising as district midwives, 21 were also trained nurses working in hospitals and 3 were health visitors.

During the year 4 midwives died, two were struck off the register, two resigned one was re-instated after a "refresher" course and the licences of three wives were cancelled on medical grounds.

TABLE 56

Distribution Of Trained Midwives: 1946

PROVINCE.	Newly licenced	Licence cancelled	TRANSFERRED		Died	TOTAL remaining
			to	from		
Blue Nile	7	3	—	—	—	77
Darfur	2	—	—	—	—	13
Equatoria	—	—	—	—	—	—
Kassala	1	—	—	—	1	32
Khartoum	7	2	3	—	—	93
Kordofan	2	1	—	—	—	45
Northern	4	1	1	1	1	91
Upper Nile	—	—	1	—	—	5
TOTALS	23	7	5	1	2	356

There were 35 pupils in residence in training in December 1946 and 23 were granted certificates after examination.

Ten midwives were given a refresher course and ten village midwives, having completed a modified course, were granted second class certificates of training.

TABLE 57.

Omdurman Midwifery Service 1946

Cases Seen By Midwives School: Deliveries And Complications

DETAIL OF CASES		Number of Cases attended		Total
		By School Staff	By Others	
Full term in homes		421	2,181	2,602
Abortions		3	38	41
TRANSFERRED TO HOSPITAL:				
Placenta praevia	2			
Breech	3			
Breech with prolapsed cord	1			
Forceps delivery	3			
Craniotomy	1			
Caesarean section	2			
Premature labour	1			
Eclampsia	2			
Pre-eclamptic	1			
Face presentation	1			
No record made	24			
6/12 Abortion	1	23	19	42
Cases Attended		447	2,238	2,685
TOTAL BIRTHS IN HOMES		439	2,220	2,659
(*a*) Live births		411	2,141	2,552
(*b*) Still births		16	53	69
(*c*) Twins		12	26	38
(*d*) Triplets		—	—	—
POST-PARTUM COMPLICATIONS		28	22	50
Retained Placenta		2	3	5
P. P. H. attended by doctor		9	5	14
P. P. H. attended by midwives		5	—	5
Puerperal Syrexia		3	6	9
„ „ after haemorrhage		1	—	1
„ „ as a result of sepsis		4	3	7
Transferred to Hospital		4	5	9

There are antenatal clinics in being at the Midwives School and at the Morada Welfare Centre.

Figures for the year 1946 were :

TABLE. 58

CLINICS.	Old Cases		New Cases		TOTAL	
	1945	1946	1945	1946	1945	1946
Midwives' School Clinic	3,323	3,360	2,541	2,443	5,864	5,803
Morada clinic	1,467	1,604	661	737	2,128	2.341
TOTALS	4.790	4,964	3202	3,180	7,992	8.144

At the gynaecological clinic the following cases were seen:

YEARS.	Old Cases	New Cases	Total
1945	85	152	237
1946	249	345	594

CHAPTER XIV.

OTHER TRAINING

There were 18 specially selected hospital attendants in the course for Medical Assistants in Omdurman Civil Hospital.

The course lasts twelve months and is designed to train Medical Assistants for the dispensaries of the Northern Sudan.

There were 23 trainees in the School at Juba Civil Hospital. This school trains Medical Assistants, Sanitary Overseers, Laboratory Assistants, and dispensers for the Southern Sudan.

In 1946 5 trainees completed their training as Medical Assistants, one as sanitary overseer and one as laboratory assistant.

At the Central Nurses Training School in Omdurman Civil Hospital, there were 40 nurses under training and 18 completed the course and passed the final examination.

CHAPTER XV

THE S.M.S. GRAPHIC MUSEUM.

The Museum continued to supply propaganda models, posters, and other forms of exhibits for health centres, agricultural shows, and tribal gatherings. The museum plays an important part in the teaching and training of Medical Students, public health officers, health visitors and other S.M.S. Staff. Recorded visits by the public during the year numbered 3799.

The standing exhibition comprises :-

Photographs	1971
Charts	222
Drawings	101
Descriptive notes	239
Maps	69
Posters	12
Models	161
Specimens	604

TABLE I.

STAFF OF SUDAN MEDICAL SERVICE
ESTABLISHMENT OF CLASSIFIED OR CERTIFICATED OFFICIALS

Category	Establishment		
	British	Sudanese	Others
Headquarters.			
Director	1	—	—
Assistant Director (Public Health)	1	—	—
Assistant Director (Hospitals)	1	—	—
D. A. D. (Quarantine)	—	1	—
Controller of Medical Stores	1	—	—
Principal Matron	1	—	—
Superintendent	1	—	—
Chief Public Health Inspector	1	—	—
A/Chief Public Health Inspector	1	—	—
Head Staff Clerk	—	1	—
Staff Clerk	—	2	—
Clerk	—	24	—
Head Accountant	1	—	—
Accountant	—	2	—
Bookeepers	—	20	—
Superintendent of Stores	1	—	—
Storekeepers	—	9	—
Stores Supervisor	—	3	—
Hospitals and Dispensaries.			
Senior Physician	1	—	—
Senior Surgeon	1	—	—
Gynaecologist	1	—	—
Ophthalmologist	1	—	—
Medical Inspector	31	12	—
Dental Surgeon	1	—	—
Assistant Ophthalmologist	—	1	—
Radiographer	1	—	—
Medical Registrar	—	1	—
Surgical Registrar	—	1	—
Lady Doctor (Contract)	1	—	—
Obstetrical Registrar	—	1	—
Medical Officer	—	73	—
Housemen (recent graduates)	—	9	—
Medical Assistants	—	359	—
Matron, Khartoum Civil Hospital	1	—	—
Matron, Nurses' School, Omdurman	1	—	—
Charge Sister	10	—	—
Nursing Sister	16	—	—
Nurses (Certificated)	—	5	—
Staff Nurses	—	11	—
Dental Mechanic	1	—	—
Assistant Radiographer	—	9	—
Assistant Radiographer under training	—	1	—
Pharmacist	—	—	2
Dispenser	—	10	—
Dispenser under training	—	5	—
Bookkeeper	—	88	—
Clerks	—	23	—
Hors Cadre Southern Trainees (1/11 Status)	—	9	—
Hors Cadre Tutor (Scale K1 Status)	—	1	—
Storekeepers	—	6	—
Southern Storekeeper	—	3	—
Head Hospital Orderly, male	—	31	—
Theatre Attendant, male	—	23	—
Carried forward	77	734	2

CATEGORY.	ESTABLISHMENT		
	British	Sudanese	Others
Brought forward	77	734	2
Public Health.			
Medical Officer of Health, Khartoum	1	—	—
Assistant Medical Officer of Health Khartoum	—	1	—
A/Medical Officer of Health (Special Duties)	1	—	—
Senior Public Heath Inspector	6	—	—
Public Health Inspector	3	—	—
Public Health Officers	—	21	—
Sanitary Overseers	—	97	—
Principal, Midwives School	1	—	—
Charge Sister	1	—	—
Supervisor of Health Visitors	1	—	—
Clerk	—	5	—
Staff Midwife	—	5	—
Staff Nurse	—	—	—
Staff Health Visitor	—	2	—
Health Visitor	—	6	—
Reseach and Laboratory Service.			
Stack Medical Research Laboratories.			
Assistant Director (Research) S.M.S.	1	—	—
Bacteriologist	1	—	—
Assistant Bacteriologist	—	1	—
Senior Laboratory Assistant	1	—	—
Laboratory Assistant	3	45	—
Head Laboratory Attendant	—	2	—
Clerk	—	2	—
Medical Entomology.			
Medical Entomologist	1	—	—
Technical Assistant	—	3	—
Clerk	—	1	—
Aedes Control Officer	—	1	—
Welcome Chemical Laboratories.			
Government Analyst	1	—	—
Chemist	1	—	—
Technical Assistant	—	5	—
Junior Technical Assistant	—	2	—
Clerk	—	1	—
Kitchener School of Medicine.			
Dean	1	—	—
Library Clerk	—	—	1
S.M.S. Graphic Museum.			
Assistant Curator	—	1	—
Museum Attendant	—	3	—
TOTAL	101	938	3

The unclassified employees number approximately 4,273.

TABLE II (a)

INCOME AND EXPENDITURE OF THE S.M.S. OVER THE LAST FOUR YEARS

ITEMS.	1943	1944	1945	1946
	£E.	£E.	£E.	£E.
Revenue	72,569	68,313	67,839	70,537
Expenditure :				
Personnel and Personal Allowances ..	213,946	243,969	278,714	285,662
Services	146,066	227,882	198,596	296,451
Extraordinary	1,901	2.612	4,576	7,273
TOTAL	361,913	474,463	481,886	589,386

TABLE II (b)

ANALYSIS OF THE S.M.S. EXPENDITURE IN 1946

ITEMS.	Personnel	Services	Extraordinary	Total
	£E.	£E.	£E.	£E.
Headquarters	17,218	42,546	1,770	61,534
Hospitals and Dispensaries..	202.964	217,359	4,474	424,797
Hygiene and Public Health	47,570	33,380	1,029	81,979
Research	16,145	3.166	—	19,311
Graphic Museum	323	—	—	323
Seconded Staff	1,442	—	—	1,442

TABLE III

SUDAN 1946

ADMISSION AND DEATHS BY DISEASES

	Blue Nile		Darfur		Equatoria		Kassala		Khartoum		Kordofan		Northern		Upper Nile		Total	
	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths
1. T. B. Pulmonary	186	25	21	6	64	21	157	26	192	35	117	24	127	33	24	7	888	177
2. T. B. Non-Pulmonary ..	148	10	6	1	33	2	94	9	168	10	48	4	91	2	25	—	613	38
3. Syphilis	840	—	4,137	5	1,307	5	699	2	117	—	2,758	9	429	5	1,269	—	11,556	26
4. Gonorrhoea	725	—	540	1	497	—	959	—	318	—	1,420	—	399	—	223	—	5,081	1
5. Soft Sore	44	—	29	—	16	—	71	—	71	—	81	1	7	—	16	—	335	1
6. Trachoma	124	—	68	—	37	—	54	—	52	—	51	—	61	—	10	—	457	—
7. All other eye diseases.. ..	262	1	245	—	640	1	223	1	1,185	—	514	—	631	—	276	1	3,976	4
8. Ear	87	1	19	—	153	1	46	—	45	—	82	6	45	—	13	—	490	8
9. Skin	244	—	205	—	739	—	124	—	121	—	311	55	174	—	68	1	1,986	56
10. Wounds and other injuries	3,227	47	2,561	40	5,027	67	2,442	26	1,431	42	3,143	6	1,655	49	941	13	20,427	290
11. Tumours Malignant ..	52	5	7	2	17	3	21	1	51	10	49	2	29	2	3	—	229	25
12. Tumours Non-Malignant ..	51	2	47	1	163	2	49	1	94	—	53	6	41	2	18	—	516	14
13. Gynaecological	513	4	52	1	58	2	184	3	523	4	229	5	153	1	55	1	1,767	21
14. Confinements	272	13	37	6	113	9	97	2	529	4	113	8	101	3	16	—	1,278	45
15. Poisoning	15	1	21	—	44	3	7	1	21	9	25	—	46	—	1	—	180	14
16. Ancylostomiasis	9	1	10	—	1,300	24	11	—	4	1	1	1	20	—	9	—	1,364	27
17. Schistosomiasis	564	25	58	—	745	4	65	—	67	—	194	—	105	3	10	—	1,808	32
18. Blackwater Fever	4	2	—	—	—	—	2	1	—	—	1	—	—	—	2	—	9	3
19. Dysentery, Amoebic ..	689	14	644	14	121	11	541	15	337	7	699	19	215	7	142	9	3,388	96
20. Dysentery, Bacillary.. ..	54	11	1	—	23	5	164	—	88	1	41	3	47	2	32	2	450	24
21. Filariasis	5	—	7	—	18	—	1	—	—	—	6	1	—	—	1	—	38	1
22. Madura disease	101	1	12	—	—	—	22	—	65	—	31	1	43	—	—	—	274	2
23. Malaria	4,137	62	1,127	5	1,869	23	2,048	18	976	10	3,804	56	1,781	25	773	14	16,515	213
24. Leishmaniasis	84	21	5	—	12	—	143	26	5	—	13	3	2	—	4	—	268	50
25. Trypanosomiasis	—	—	—	—	56	8	—	—	—	—	—	—	—	—	—	—	56	8
26. Yaws	—	—	3	—	3,257	5	—	—	—	—	—	—	—	—	86	—	3,346	5
27. Heat Stroke	—	—	—	—	—	—	9	—	—	—	—	—	3	1	—	—	12	1
28. Dracontiasis	26	—	9	—	225	2	155	1	3	—	80	1	3	—	11	—	512	4
29. Tropical Ulcer	455	—	116	—	4,022	23	46	—	37	—	495	—	3	—	153	—	5,327	23
30. Anthrax	—	—	—	—	—	—	4	—	—	—	—	—	—	—	—	—	4	—
31. Cerebrospinal Meningitis ..	14	8	2	2	566	132	2	2	—	—	8	5	5	5	6	1	603	155
32. Chickenpox	197	1	266	—	565	—	207	—	207	—	367	—	87	1	38	1	1,934	3
33. Dengue	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
34. Diphtheria	36	8	6	1	3	—	51	10	170	23	31	4	43	15	3	—	343	61
35. Enteric Fever..	20	5	2	—	4	—	12	2	42	4	6	—	17	—	15	3	118	14
36. Erysipelas	5	—	—	—	1	—	3	—	—	—	3	—	2	—	2	—	16	—
37. Gastro Enteritis of Children	18	3	—	—	106	6	10	3	392	29	89	8	101	11	14	3	730	63
38. Influenza	7	—	48	—	42	—	163	—	15	—	122	1	46	3	—	—	442	4
39. Leprosy	16	—	11	3	31	8	3	—	—	—	13	—	5	—	3	—	82	11
40. Undulant Fever	12	—	2	1	5	2	19	—	3	—	5	—	—	—	6	—	52	3
41. Measles	44	—	32	—	331	11	67	1	49	1	9	—	11	—	20	—	563	13
42. Mumps	32	—	184	—	156	2	135	—	4	—	209	—	27	—	23	—	770	2
43. Pellagra	—	—	—	—	1	—	—	—	—	—	—	—	1	—	1	—	3	—
44. Puerperal Fever	30	3	—	—	—	—	3	2	12	2	9	—	10	1	1	—	65	8
45. Phlebotomus Fever	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
46. Pneumonia	1,147	80	379	39	1,040	85	572	52	747	62	571	62	323	68	56	3	4,835	451
47. Rabies	20	4	2	2	4	3	—	—	1	1	4	4	2	2	—	—	33	16
48. Relapsing Fever	150	12	51	43	—	—	32	2	2	—	59	1	19	1	319	6	632	65
49. Acute Rheumatism	38	1	15	—	7	—	12	—	27	—	18	—	74	1	5	—	196	2
50. Smallpox	—	—	1	—	41	1	—	—	1	—	2	—	1	—	—	—	46	1
51. Tetanus	27	12	3	2	15	9	6	5	9	2	14	5	3	1	3	1	80	37
52. Whooping Cough	29	2	5	—	33	—	12	—	30	—	20	—	36	1	19	2	184	5
53. Circulatory System	429	50	38	9	179	14	159	15	502	61	204	37	336	65	19	3	1,866	254
54. Respiratory System ..	675	24	112	2	1,196	15	481	8	948	34	970	31	515	30	219	10	5,116	154
55. Alimentary System	1,258	57	285	15	1,980	93	781	71	1,332	81	1,038	64	1,084	104	292	13	8,050	499
56. Genito-Urinary System ..	452	22	94	5	142	5	330	9	337	8	374	19	279	30	45	—	2,053	98
57. Nervous System	123	10	30	2	60	2	103	9	150	6	60	1	58	5	20	—	604	35
58. Scurvy	17	—	—	—	33	—	38	—	10	—	9	1	3	—	2	—	112	1
59. Diabetes	31	1	3	—	2	—	31	2	77	5	10	3	27	1	1	—	182	12
60. Fever of uncertain origin ..	232	18	62	1	234	6	377	33	480	19	176	10	414	54	61	5	2,036	146
61. Beri Beri	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	1	—
62. All other Diseases	897	35	264	7	2,881	61	737	18	1,455	38	894	20	641	127	1,167	10	8,936	316
															River	Hospital	2,753	
TOTAL	18,874	602	11,884	216	30,214	676	12,703	377	13,502	509	19,653	487	10,381	662	6,542	109	126,586	3,638

TABLE IV

SUDAN 1946

OUTPATIENTS : NEW CASES AND TOTAL ATTENDANCES

DISEASE	BLUE NILE	DARFUR	EQUATORIA	KASSALA	KHARTOUM	KORDOFAN	NORTHERN	UPPER NILE	TOTAL
1. T.B. Pulmonary	330	24	136	310	202	151	342	18	1,513
2. T.B. Non-Pulmonary ..	92	7	41	235	179	67	161	3	785
3. Syphilis	12,034	14,340	6,190	13,614	5,530	24,886	5,787	8.584	90,965
4. Gonorrhoea	5,175	1,695	1,965	4,126	3,256	4,131	2,125	745	23,218
5. Soft Sore	1,519	301	293	1,573	562	512	37	67	4,864
6. Trachoma	42,021	4,285	734	21,543	56,501	6,236	50,456	1,154	182,930
7. All Other Eye Diseases ..	96,693	10,476	23,611	34,306	30,618	50,562	47,827	11,122	308,215
8. Ear	20,429	2,926	4,594	8,284	8,730	10,317	12,685	1,397	69,362
9. Skin	18,677	3,927	14,580	6,556	5,404	19,516	5,881	1,758	76,299
10. Wounds and other injuries	144,577	26,932	65,835	91,312	58,759	75,352	42,192	13,307	518,266
11. Tumours Malignant ..	64	7	17	22	57	83	34	3	287
12. Tumours Non-Malignant ..	3,867	112	165	110	117	175	470	18	5,034
13. Gynaecological	480	52	68	641	2,551	1,257	438	32	5,519
14. Confinements	505	37	111	108	598	189	108	1	1,657
15. Poisoning	66	23	52	9	88	44	66	6	354
16. Ancylostomiasis	57	47	3,777	21	34	12	59	9	4,016
17. Schistosomiasis	5,081	1,500	2,243	347	443	4,229	8,386	84	22,312
18. Blackwater Fever ..	5	—	2	2	—	1	—	4	14
19. Dysentery, Amoebic ..	11,346	2,607	699	4,445	2,961	4,633	6,158	536	33 385
20. Dysentery, Bacillary ..	325	2	343	459	151	293	100	24	1,697
21. Filariasis	6	7	60	1	—	7	—	—	81
22. Madura disease	1,094	12	—	24	72	80	45	3	1,330
23. Malaria	158,229	8,864	10,783	22,149	8,825	83,280	19,019	9,971	321,120
24. Leishmaniasis	60	5	13	143	5	13	3	4	246
25. Trypanosomiasis	—	—	56	—	—	—	—	—	56
26. Yaws	2	15	22,427	—	—	1	—	1,001	23,446
27. Heat Stroke	—	—	—	15	6	—	4	—	25
28. Dracontiasis	83	13	1,602	556	16	472	14	37	2,793
29. Tropical Ulcer	5,164	375	17,018	1,828	176	2,665	18	1,802	29,046
30. Anthrax	—	—	—	4	—	—	—	—	4
31. Cerebrospinal Meningitis ..	30	2	656	2	—	29	5	6	730
32. Chickenpox	1,413	267	604	396	761	702	603	110	4,856
33. Dengue	5	—	—	—	—	—	—	—	5
34. Diphtheria	40	6	3	52	182	48	56	3	390
35. Enteric Fever	9	2	4	21	42	6	17	15	116
36. Erysipelas	2	—	1	3	7	4	2	—	19
37. Gastro Enteritis of Children	2,548	—	481	645	2,673	979	969	195	8,490
38. Influenza	3,220	966	238	4,773	2,270	2,412	833	78	14,790
39. Leprosy	70	16	204	23	13	48	15	4	393
40. Undulant Fever	18	2	5	19	3	5	—	6	58
41. Measles	1,372	83	429	353	987	68	541	120	3,953
42. Mumps	1,401	374	309	773	235	1,092	342	164	4,690
43. Pellagra	—	—	1	—	—	—	1	—	2
44. Puerperal Fever	56	—	—	3	11	19	18	2	109
45. Phlebotomus Fever ..	—	—	—	—	—	—	—	—	—
46. Pneumonia	3,482	396	1,208	1,045	1,754	1,310	1,267	208	10,670
47. Rabies	4	2	4	—	1	8	11	—	30
48. Relapsing Fever	462	278	—	32	4	314	22	840	1,952
49. Acute Rheumatism ..	661	15	147	561	64	239	3,339	9	5,035
50. Smallpox	—	1	57	—	1	2	1	—	62
51. Tetanus	5	3	15	5	9	16	3	1	57
52. Whooping Cough	913	7	154	597	515	851	965	75	4,077
53. Circulatory System ..	6,696	480	496	2,091	5,629	7,066	5,013	318	27,789
54. Respiratory System ..	97,572	11,641	34,721	42,100	59,336	54,990	41,044	8,067	349,471
55. Alimentary System ..	110,112	13,905	31,924	50,045	67,274	71,039	65,781	12,906	422,986
56. Genito-Urinary System ..	7,887	1,927	217	4,930	7,368	6,293	26,260	179	55,061
57. Nervous System	5.255	143	250	872	319	1,164	4,238	4	12,245
58. Scurvy	189	—	52	60	49	49	3	4	406
59. Diabetes	48	3	5	64	106	22	97	2	347
60. Fever of uncertain origin ..	31,985	1,253	2,164	14,684	25,649	5,825	15,247	7,818	105,625
61. Beri Beri	—	—	—	—	—	—	—	—	—
62. All Other Diseases ..	84,573	6,806	36,937	35,658	58,023	50,185	31,701	12,949	316,832
Total New Cases	888,009	117,169	291,701	372,550	420,125	493,949	400,809	95,773	3,080,085
ATTENDANCES : MEN	886,083	196,762	428,432	483,189	485,761	580,818	371,120	112,087	
WOMEN ..	439,746	95,320	185,238	164,354	263,256	423,990	322,064	53,546	
CHILDREN ..	766,467	133,721	191,519	254,770	423,821	633,002	501,234	69,442	
Total Attendances	2,092,296	425,803	805,189	902,313	1,172,838	1,637,810	1,194,418	235,075	8,465,742
							RIVER	HOSPITAL	9,132
									8,474,874

DIAGRAM I

SUDAN : 1946

MORTALITY i.e. DEATHS IN HOSPITALS AND DISPENSARIES BY DISEASES

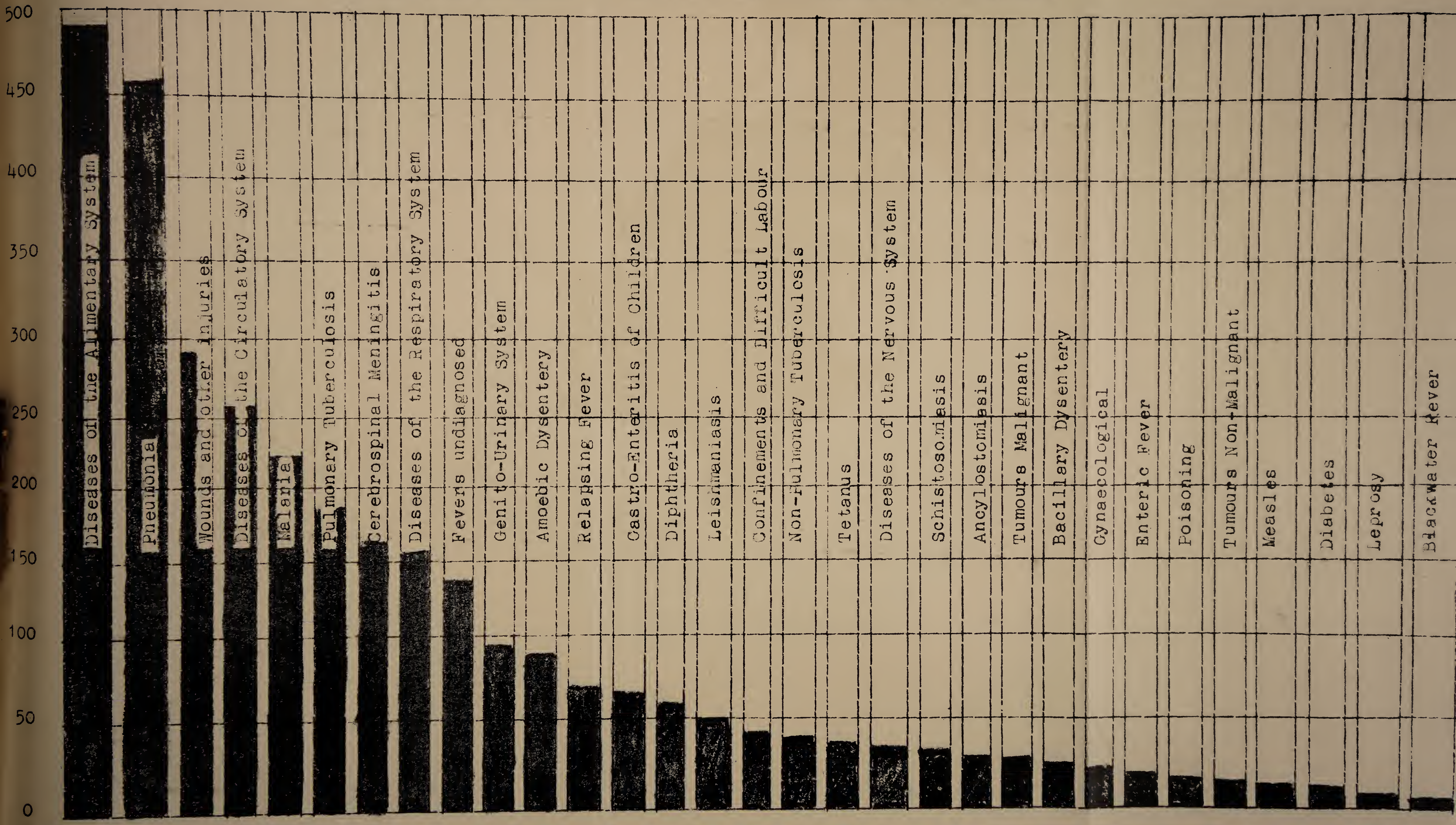

DIAGRAM II
SUDAN : 1946
FATALITY RATE IN HOSPITALS AND DISPENSARIES BY DISEASES
PERCENTAGE OF DEATHS TO ADMISSIONS